

index

PUBLIC HEALTH REPORTS

Volume 68, Numbers 1-12
January-December 1953

including

PUBLIC HEALTH MONOGRAPHS

1953 Titles, Numbers 8-17

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

THIS ISSUE of the Index to *Public Health Reports* is divided into two parts. Part 1 is the index to *Public Health Reports* and Public Health Monographs. Part 2 lists the monographs published concurrently with the various issues of *Public Health Reports*.

Titles of original articles are followed by the author's name in brackets. Example: Treatment of tuberculosis [Amberson]-----928.

The author entries appear in capital and small capital letters followed by the title. Example: AMBERSON, J. BURNS: Treatment of tuberculosis-----928.

A monograph entry in part 1 carries a "see" reference to part 2 and can be found by referring to the specified monograph number in that part.

A code is used to indicate the other entry categories. Summary articles of monographs are indicated by (MS) following the entry; original articles interpreting a monograph by (MI). Other classifications used in the index are: (B) for briefs; (CR) for conference reports; (E) for excerpts; (LN) for legal notes; and (SR) for short reports.

Titles of current departmental publications appear under the entry "Publications" and are not cross indexed. A compiled annual list of Public Health Service publications may be obtained from the Public Inquiries Branch.

A cumulative manuscript file of the 1952 and 1953 indexes is available for consultation.

Since the illustrative material on the inside of the front cover is a part of the contents, it is recommended that the front covers of each issue be included when binding the volume.

Key to Dates and Pages

<i>No.</i>	<i>Month of issue</i>	<i>Pages</i>
1	January	1-140
2	February	141-280
3	March	281-360
4	April	361-452
5	May	453-548
6	June	549-640
7	July	641-736
8	August	737-828
9	September	829-920
10	October	921-1020
11	November	1021-1140
12	December	1141-1264

Key to Classification Code

- (B) Brief
- (CR) Conference report
- (E) Excerpt
- (LN) Legal note
- (MI) Monograph interpretive article
- (MS) Monograph summary article
- (SR) Short report
- (*) No symbol is used to denote the title of
an original paper, the author entries, or
subject matter entries.

PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
Public health statesmanship----- <i>Leonard A. Scheele.</i>	1
The prevention of rheumatic fever-----	12
A community program for the prevention of rheumatic fever recurrence----- <i>Mary Alice Smith.</i>	16
Employment of the older worker----- <i>Theodore G. Klumpp.</i>	20
Tuberculin sensitivity in Alaska----- <i>Edward S. Weiss.</i>	23
Complement fixation tests for murine typhus on small mammals----- <i>Ruth Keaton, Billie Jo Nash, J. N. Murphy, Jr., and J. V. Irons.</i>	28
Provisions of State laws governing local health departments----- <i>Clifford H. Greve.</i>	31
Abatement of stream pollution caused by industrial wastes—The fundamental sciences vs. rule-of-thumb----- <i>Rolf Eliassen.</i>	43
The movement toward sound drug therapy-----	46
An objective approach to drug therapy----- <i>J. Solon Mordell and C. K. Himmelsbach.</i>	47
Four health education evaluation studies-----	54
Antimalarial activity of 4,000 compounds-----	56
Radiation exposure in the United States----- <i>Dade W. Moeller, James G. Terrill, Jr., and Samuel C. Ingraham, II.</i>	57
Chemical labeling committee reactivated-----	66
United States vital statistics, 1951-52-----	68
Birth statistics in maternal and child health programs----- <i>William Haenszel.</i>	71
Practice of public health, 1952—Part I-----	81
The APHA Conference report . . . 82. Control of chronic illness and efforts in rehabilitation . . . 83. Community organization for health: practice and precept . . . 86. New	

Continued ►

American Public Health Association

1872-1873

ON THE 18th of April 1872, an informal conference of a number of gentlemen, who for several years had been in some degree co-workers in the studies of Preventive Medicine and in duties of public sanitary service, was held in the city of New York, with the design to secure concerted effort, and establish some adequate plans in the cultivation of hygienic knowledge, and procuring more effective applications of sanitary principles and laws. . . .

The first meetings of the Association have resulted in the cheerful contribution of reports and papers upon important sanitary questions, rather than in voluble debates; the rich fruit of careful observation and study, comprehensive surveys relating to epidemics and other diseases, and logically studied truths which are required for the basis and structure of true sanitary science and for the most effective methods and proceedings in public health administration. . . .

The golden maxim of Franklin that "Public Health Is Public Wealth," is obviously true in all communities, but the same maxim now finds a higher significance in the ascertained relationship of sound and vigorous health to the social and moral interests of individuals, families, and nations.

The chief problems of civilization and humanity now demand their solution upon a basis of most exact and compre-

hensive knowledge of facts reduced to the deductions and formulas of science, and it is not arrogating unreasonable functions for the principles and the public applications of sanitary science, to say that the physiological health of the people so far underlies soundness and sufficiency of mental culture that hygiene will have to be recognized as a fundamental element of success in common education and in the higher culture, as well as in the practical solution of the great social and moral problems of our times. . . .

In this volume of Sanitary Papers the records of two deadly epidemics—the fatal strides of cholera in the great valley west of the Alleghenies, and the invasion of Shreveport and Memphis by yellow fever when those cities were utterly defenseless, unguarded, and un-

Continued on page 82.

frontispiece

The map of Lowell, Mass., is from William T. Sedgwick's report "On Recent Epidemics of Typhoid Fever in the Cities of Lowell and Lawrence Due To Infected Water Supply . . ." published in the 24th Annual Report of the State Board of Health of Massachusetts, for the year ending September 30, 1892. The family group is from the Public Health Service's 1952 APHA exhibit (see special section, page 81 ff.).

Contents for January, continued

research, service roles for the bacteriologist . . . 90. Experience with home care in four large cities . . . 92. Cancer control projects and research activities . . . 95. Laboratory—epidemiological reports from overseas . . . 99. Working links between hospital, private, State laboratories . . . 103. Prevention of poliomyelitis with gamma globulin and vaccine . . . 105. New methods and approaches in laboratory techniques . . . 108. Tuberculosis control problem and modern therapy . . . 112. Government, industry, labor in industrial hygiene . . . 115. Methods of administration in medical care plans . . . 118. Scientific, group, and community approaches to obesity . . . 124. Cooperative group action by parents of the handicapped . . . 127. Studies of spread patterns of infectious hepatitis . . . 130. The general practitioner and preventive medicine . . . 132. "Advancing the frontiers of public health" . . . 134. Field, laboratory, and legal approaches to treponemata . . . 136. Professional training for pediatricians and nurses . . . 138.

Short reports and announcements:

Frontispiece . . . ii. Origins of APHA . . . ii. PHS publications . . . 140. International certificate requires stamp . . . 11. Epidemiology course for nurses . . . 15. Indexes for 1952 . . . 27. PHS staff announcements . . . 30. Children's Bureau appointments . . . 53. Sources of morbidity statistics . . . 55. Diphtheria in the U. S. . . . 67.

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 8 Pretesting and evaluating health education.

Andie L. Knutson, Benjamin Shimberg, Jane S. Harris, and Mayhew Derryberry.

25 pages. A summary and information on availability appear on pages 54-55.

PUBLIC HEALTH MONOGRAPH No. 9 Survey of antimalarial agents: Chemotherapy of *Plasmodium gallinaceum* infections; toxicity; correlation of structure and action.

Robert G. Coatney, W. Clark Cooper, Joseph Greenberg, and Nathan B. Eddy.

323 pages. A summary and information on availability appear on page 56.



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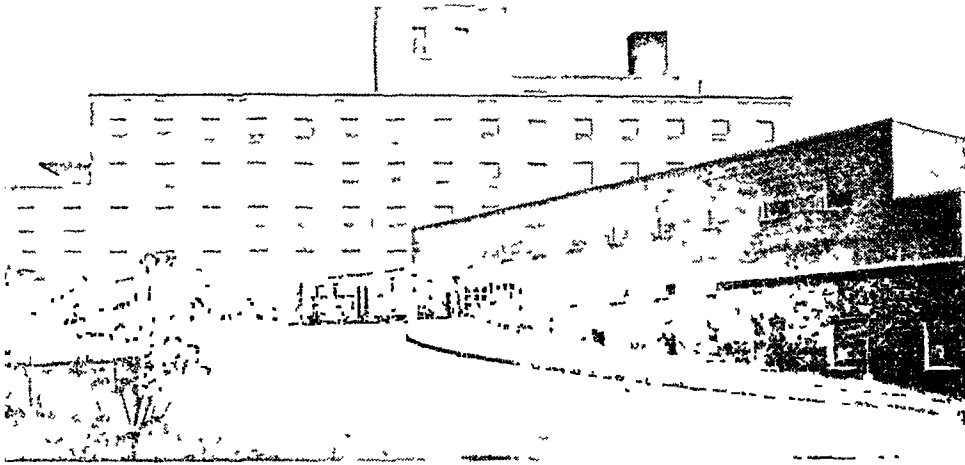
LEONARD A. SCHEELE, *Surgeon General*

PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
Effect of fluoridated public water supplies on dental caries prevalence—Seventh year of Grand Rapids-Muskegon study-----	141
<i>Francis A. Arnold, Jr., H. Trendley Dean,</i> <i>and John W. Knutson.</i>	
“We are in danger of building a Tower of Babel”-----	149
<i>Vannevar Bush.</i>	
The aggregate community picture—Psychosocial aspects of cancer---	153
<i>Edna Nicholson.</i>	
Statistics in a health department medical care plan-----	157
<i>Matthew Taback and Huntington Williams.</i>	
Selective case finding in syphilis control-----	167
<i>George Moore and Malcolm T. Foster.</i>	
Chronic disease mortality in influenza epidemics-----	173
The state of the Nation's public health services-----	174
Report on programs and problems, 1953-----	174
<i>Leonard A. Scheele.</i>	
Report on Federal-State relations-----	181
<i>John W. Thurston.</i>	
Report on child health and welfare-----	183
<i>Martha M. Eliot.</i>	
Report on international staffing-----	188
<i>Henry van Zile Hyde.</i>	
1950 census findings on health occupations-----	191
Seasonal occurrence of communicable disease—1951 and 1952 summary-----	194
Practice of public health, 1952—Part II-----	197
BW defense, general services of virus laboratories . . .	199.
A century of progress in sanitary engineering . . .	202.
Epidemiological and control aspects of anthrax . . .	205.
Policies for the promotion of healthful school life . . .	207.
Scope and characteristics of occupational health . . .	209.
Philosophies and practices in school health . . .	213.
Maternal and infant mortality surveys and evaluations . . .	218.
Water fluoridation programs and community health . . .	220.
Field	



The 117-bed King's Daughters' Hospital at Staunton, Va. (frontispiece and above). a community hospital built in 1951 with the aid of funds provided through the Federal Hospital Survey and Construction Act, replaced a 61-bed obsolete facility which had been operating at more than capacity under most difficult circumstances. Occupancy in the new building during the first year rose to almost 100 percent. However, the new hospital is planned for expansion: the kitchen, laundry, boiler room, and laboratory could take care of a 75-bed addition with only minor alterations.

As an intermediate hospital, the institution cooperates with the State's medical colleges in their intern and consultant programs. It also extends special services, particularly pathology, to many physicians in nearby communities and to the Waynesboro Community Hospital.

The Augusta - Staunton - Waynesboro Health Department is located in the hospital building, making for easier and closer association in its joint efforts with the hospital.

The hospital has attracted a number of additional physicians to the city and has had no staffing problems except in the nursing department. It has solved this problem, at least to a degree, through a practical nurse training program operated jointly with the local high school. In their senior year, selected applicants complete the academic phases of practical nurse training as approved by the State. They then join the hospital staff for the necessary in-service training. As students they help the professional nursing staff. Some of them remain with the hospital after completion of their training; and some go on to professional nursing schools.

The exterior (above) shows the main hospital building and main entrance, with the wing which houses the health department at the right.

On the frontispiece, one of the nurseries is shown at the upper left. At the center left is another view of the main entrance, and at the lower right a nursing station is shown. (Architects: York & Sawyer. Photographs by Sigurd Fischer.)

Contents for February. continued

Practice of public health, 1952, Part II—continued

research and appraisal in health education . . . 224. Nursing home responsibilities of State health departments . . . 228. Business methods and standards in health administration . . . 229. Developments and policies in water conservation . . . 234. Planning and team approaches to a better environment . . . 236. Standard methods for examination of dairy products . . . 243. New methods in examination of water and sewage . . . 245. School health service trends and research studies . . . 248. Studies and programs in dental public health . . . 251. Use of surveys as yardsticks in public health . . . 254. Health programs—Their aid to handicapped children . . . 256. Laboratory and field advances in food sanitation . . . 260. Importance of animal diseases to the health of man . . . 263. Problems, methods, programs in community fly control . . . 267. Methods and practice in the provision of medical service . . . 269. New and developing elements in public health programs . . . 273. Techniques in health statistics and records management . . . 277.

Short reports and announcements:

Frontispiece . . . ii. PHS publications . . . 196. Psycho-social aspects of cancer . . . 152. Mrs. Hobby New Federal Security Administrator . . . 193.

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 10 . . . Excess deaths from chronic disease during influenza epidemics.

Selwyn D. Collins and Josephine Lehmann.

22 pages and illustrations. A summary and information on availability appear on p. 173.



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
Rehabilitation in the hospital----- <i>Howard A. Rusk.</i>	281
Occupational factors in lung cancer—A preliminary report----- <i>Lester Breslow.</i>	286
Venereal disease contact investigation—A combined military- civilian program----- <i>Nicholas J. Fiumara, Jack Segal, and Jack Jolly.</i>	289
The public health training program of New York State----- <i>Franklyn B. Amos.</i>	295
Tennessee accident fatalities, 1946-50----- <i>Anna Love Sullivan.</i>	301
Reactivity of VDRL antigen suspensions made at various tempera- tures----- <i>Paul Fugazzotto.</i>	304
Recent progress in cancer research----- <i>John R. Heller, Jr.</i>	309
Mechanical air drying of hands following preoperative scrubbing--- <i>Paul E. Walker.</i>	317
Histoplasmin and tuberculin sensitivity in Texas infants and children----- <i>Gilbert B. Forbes and Charles C. Chang.</i>	320
Public health in the western States----- <i>Wilton L. Halverson.</i>	323
Health conservation activities of TVA----- <i>O. M. Derryberry.</i>	327
Insect and rodent control in epidemics and disasters----- <i>John S. Wiley and Porter A. Stephens.</i>	334

frontispiece . . .

Cancer research in the past 20 years and particularly since World War II has produced notable advances in both the treatment and diagnosis of cancer, despite the fact that it has yet to provide an all-purpose cure (see page 309). One of these advances is the development of the use of radioisotopes. Shown on the frontispiece is a technician holding a plastic block containing a beaker of radioactive phosphorous, one of a number of radioisotopes under study. The plastic material is dense enough to shield the technician from harmful radiation. Phosphorous has so far been used in whole body radiation and in the treatment of polycythemia vera and certain chronic leukemias. It has also been used, with limited success, as a tracer in the diagnosis of cancer of the brain, breast, and testicle.

Contents for March, continued

	<i>Page</i>
The positive approach to a tuberculosis nursing program----- <i>Doris E. Roberts.</i>	338
Capillary tube technique for serologic screening of syphilis----- <i>Charles R. Freeble, Jr. and Bertina Orsburn.</i>	341
Identifying common flies----- <i>Harold R. Dodge.</i>	345
Reported tuberculosis morbidity, January-June 1952-----	351
Industrial sickness absenteeism rates for specific causes in 1951 and half of 1952-----	353
Influenza prevalence trends in the United States-----	358
Short reports and announcements:	
Frontispiece . . . ii. Ideas . . . 288. PHS publica- tions . . . 360. Visiting scientist program . . . 285. Public health training courses . . . 294. PHS staff announce- ment . . . 308. Special notice . . . 333. Heart disease facility . . . 350. Census of mental patients . . . 352. World Health Day . . . 357.	



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
Effect of fly control on diarrheal disease in an area of moderate morbidity----- <i>Dale R. Lindsay, William H. Stewart, and James Watt.</i>	361
The 1952 encephalitis outbreak in California----- <i>Wilton L. Halverson, William Allen Longshore, Jr., and Richard F. Peters.</i>	369
Time study of public health activities in Mississippi----- <i>J. A. Milne, Margaret E. Rice, John B. Hozier, and Grace B. Taranto.</i>	378
Twenty years of followup experience in a long-range medical study-- <i>Eunice Rivers, Stanley H. Schuman, Lloyd Simpson, and Sidney Olansky.</i>	391
Child health day-----	396
Maternal and child health services—Challenges and aims----- <i>Leona Baumgartner.</i>	397
Cardiovascular syphilis in a general medical clinic----- <i>S. P. Lucia, Vernon C. Harp, Jr., and M. L. Hunt.</i>	405
Public health in Indonesia----- <i>E. Ross Jenney.</i>	409
Trichinosis: First National Conference, 1952—Eight précis-----	416
A health and economic problem----- <i>Vernon B. Link.</i>	417
Garbage-borne swine diseases----- <i>James H. Steele.</i>	418
Trichinae in swine----- <i>Benjamin Schwartz.</i>	418
Prevalence and prevention----- <i>S. E. Gould.</i>	419
Federal meat inspection----- <i>A. R. Miller.</i>	419

Continued ►

The Challenge of the First Week of Life

IN LESS than four decades America has witnessed a reduction of more than two-thirds in its infant death rate. This saving in lives of infants has been achieved chiefly through the control of diarrhea and enteritis, and of pneumonia and influenza. The greatest saving has been in babies 1 week to 1 year of age.

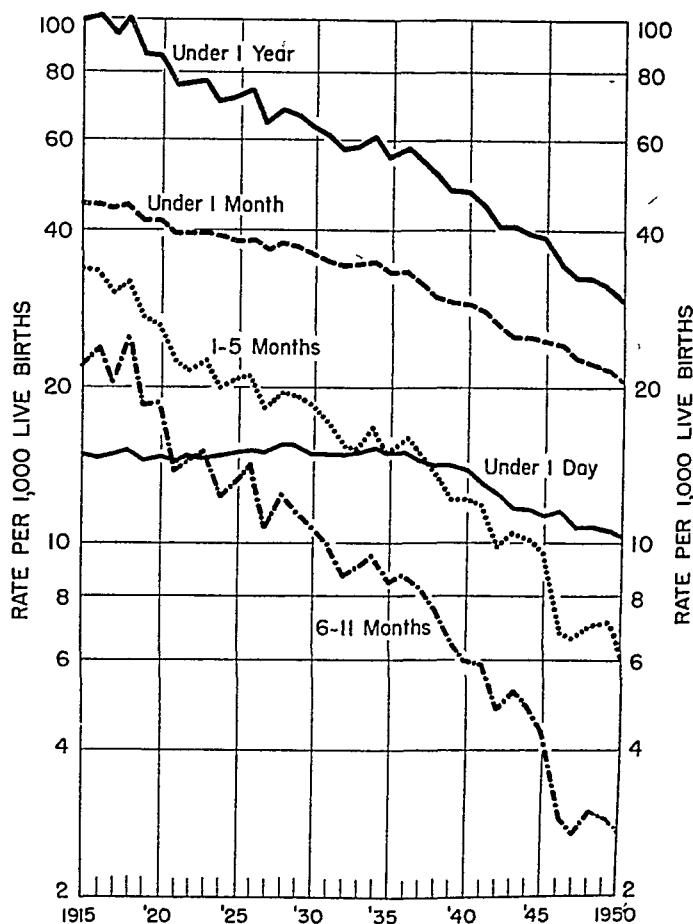
Today mortality in the first week of life presents a primary challenge. In 1950, the infant death rate for the first week was 17.8 per 1,000 live births. Immaturity was reported as contributing to the deaths of 42,988 infants in 1950. The death rate per 1,000 live births in that year totaled 29.2. The rate for deaths associated with immaturity was 12.1. Immaturity as the sole factor in death was recorded for 22,413 infants.

To reduce this toll requires more good obstetrical care, special hospital facilities, and pediatricians and nurses with training in the care of premature babies.

When an infant is born prematurely and has to be separated from its mother, it is difficult to achieve the intimate relationship which ordinarily develops between mother and baby as she cares for it during the early weeks of life. When the mother begins to take care of her baby she may need help not only on how to feed and clothe the infant, but also in attaining a sense of security for herself and her baby.

Premature birth, however, is but one of the challenges to maternal and child health in 1953. For a discussion of both challenges and goals, see page 397.

Infant mortality rates by age,
birth-registration States, 1915-50



frontispiece

A nurse trained in the care of the premature infant is shown feeding an infant by means of a stomach tube in this Virginia State Department of Health photograph.

Contents for April, continued

Trichinosis: First National Conference, 1952—Continued	Page
Low-temperature treatment..... <i>Donald L. Augustine.</i>	419
Effect of ionizing radiation..... <i>Henry J. Gomberg and S. E. Gould.</i>	419
State problems in control..... <i>Oscar Sussman.</i>	420
Trichinosis control and vesicular exanthema..... <i>Jack C. Haldeman, James H. Steele, and Ralph J. Van Derwerker.</i>	421
Hospital beds in the United States in 1953..... <i>John W. Cronin, Maurice E. Odoroff, and Leslie Morgan Abbe.</i>	425
General regulatory powers and duties of State and local health authorities..... <i>Ruth M. Moldenhauer and Clifford H. Greve.</i>	434
An experiment with group conferences for weight reduction..... <i>A. L. Chapman.</i>	439
Mortality in the United States, 1900-1950..... <i>Tavia Gordon.</i>	441
Milk sanitation honor roll for 1951-52.....	445
A facility for use of radioactive isotopes in a general hospital.....	449
Short reports and announcements:	
Frontispiece . . . ii. Infant mortality . . . ii. Vending stand program . . . 367. Public Health Service staff announcements . . . 390. Venereal disease symposium . . . 395. Child adoption . . . 404. Diabetes exhibits . . . 408. Heart disease screening . . . 415. Public health training courses . . . 433. World health achievements . . . 438. Immunization information . . . 448.	



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Published since 1878

Contents

	Page
Poliomyelitis distribution in the United States..... <i>Robert E. Serfling and Ida L. Sherman.</i>	453
Public health operating statistics..... <i>Robert G. Webster.</i>	467
Fog and deaths in London, December 1952..... <i>John A. Scott.</i>	474
Health developments in rural America, 1953. A conference report on the American Medical Association's eighth National Conference on Rural Health.....	480
Looking back to look ahead in rural health..... <i>F. S. Crockett.</i>	480
Highlights: Group health insurance advised for farm families. Facts on food values needed in rural areas. New hospital achieved by community action. Community shows way to get physician. Small town practice chosen over big city. Helicopter suggested to transport patients. Medical care insurance seen as a responsibility.....	485
Briefs:	
County health councils and public health..... <i>Franklin D. Yoder.</i>	489
The place of the physician in rural health activities..... <i>Charles Reid Henry.</i>	490
Dental aspects of rural health in Oregon..... <i>Harold J. Noyes.</i>	492
Climate and endemic dental fluorosis..... <i>Donald J. Galagan and Glenn G. Lamson, Jr.</i>	497
Developing trends and standards of sound drug therapy—a sym- posium of the AAAS.....	509
A public responsibility..... <i>Linwood F. Tice.</i>	509
The United States Pharmacopeia..... <i>Lloyd C. Miller.</i>	510
The National Formulary..... <i>Justin L. Powers.</i>	513
New and Nonofficial Remedies..... <i>R. T. Stormont.</i>	515

Continued ►

frontispiece . . .

The assault on poliomyelitis has many scientific facets. The disease is being investigated in the medical and public health laboratories, in the hospitals and medical centers, in the homes and communities where it appears. The inside cover picture symbolically represents some of the field approaches to the study of possible environmental factors in the transmission of poliomyelitis. In the Paulding County, Ohio, farmyard of a family of 5—with poliomyelitis diagnosed in 2 of the 3 children in 1950—are shown: an interviewer (far left) recording the family's medical history as given by the father; a physician and nurse drawing blood samples from the 3 children on the porch; a public health engineer (foreground) taking a water sample while another (rear, left) inspects an abandoned privy; an entomologist (center, stooping) counting flies on grill; behind him another entomologist hanging a light trap on windmill tower to attract other insects; and at right rear 2 veterinarians taking a blood sample from the family cow.

A review of morbidity trends in poliomyelitis in the United States, with special reference to the 1932-52 period, appears on pages 453-466.

Contents for May, continued

	Page
Accepted Dental Remedies.....	516
<i>J. Roy Doty.</i>	
Comments on the symposium.....	517
<i>Louis C. Zopf.</i>	
Survey of consultant nurses in health agencies.....	519
<i>Pearl McIver.</i>	
Science and public health research in Alaska, the new frontier— Briefs:	
Introduction	527
The trend of science.....	528
<i>Margaret Lantis.</i>	
The social sciences.....	529
<i>Margaret Lantis.</i>	
Enteric diseases.....	531
<i>Frank P. Pauls.</i>	
Animal-borne diseases	533
<i>Robert Rausch.</i>	
Hydatid disease control.....	534
<i>Benjamin D. Blood.</i>	
A distemperlike disease.....	535
<i>Karl R. Reinhard.</i>	
Mosquito control.....	536
<i>Charles S. Wilson.</i>	
Mastoiditis	537
<i>Milo H. Fritz.</i>	
Two water systems in northern Canada.....	538
<i>Stanley S. Copp.</i>	
Water pollution studies.....	539
<i>Amos J. Alter and William L. Porter.</i>	
Anchorage food study.....	541
<i>Edward M. Scott and Edward S. Weiss.</i>	
Community-wide X-ray surveys, 1945-53, conducted with Public Health Service assistance.....	546
Short reports and announcements:	
Frontispiece . . . ii. PHS films . . . 542. PHS publica- tions . . . 543. Type 1 poliomyelitis virus . . . 466. Papers on public health statistics . . . 473. New Depart- ment of Health, Education, and Welfare . . . 496. Infant care research . . . 518.	



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PUBLIC HEALTH REPORTS

Published since 187

Contents

	<i>Page</i>
Medical education scholarship loans in the Mississippi integrated health program----- <i>Felix J. Underwood.</i>	549
Time between tuberculosis reporting and death----- <i>Edward X. Mikol and Ben Z. Locke.</i>	554
Village polyclinics in Middle Java----- <i>Warren A. Ketterer.</i>	558
Serology of brucellosis in rural Indiana----- <i>S. R. Damon, C. R. Donham, L. M. Hutchings, B. T. Simms and James H. Steele.</i>	563
Health services and juvenile delinquency----- <i>Martha M. Eliot.</i>	572
Psychiatric referrals for delinquent children----- <i>George E. Gardner.</i>	578
Studies on dental care services for school children—First and second treatment series, Richmond, Ind.----- <i>George E. Waterman and John W. Knutson.</i>	583
Adult guidance center, San Francisco----- <i>McClain Johnston.</i>	590
Evaluation of sanitation programs in a city-county health department----- <i>J. A. Salvato, Jr.</i>	595
The national conference on world health-----	600
The nature of the World Health Organization----- <i>Henry van Zile Hyde.</i>	601
Two cooperative projects of WHO and UNICEF----- <i>S. M. Keeney.</i>	606

Continued ▲

frontispiece . . .

Klickitat Valley General Hospital (center) was opened in December 1949 at Goldendale, Wash. For adequate hospital care before then, patients crossed the Columbia River—on an unscheduled ferry—to The Dalles in Oregon or traveled to Yakima, 81 miles away. The community had no physician.

The new 23-bed hospital is the first hospital completed in Washington State under the Hospital Survey and Construction Act (Hill-Burton program). Shown here are some of its well-equipped facilities.

A darkroom is adjacent to the X-ray room (lower left). The surgery (lower right) and obstetrical room share a high-powered, explosion-proof ventilating system to carry off anesthetic gases. The cheerful furnishings in each patient room (lower center) and the reception room (upper right) were do-



Goldendale's only hospital was this rented frame residence until 1949.

nated by Goldendale citizens. The new plant has almost a quarter of an acre of floor space.

Since the completion of its modern hospital, two young general practitioners have moved to Goldendale. Specialists in orthopedic surgery, gynecology, and radiology now come regularly from Yakima, The Dalles, and Portland, Oreg. The hospital cooperates with the local health department in sponsoring chest clinics.

Immediate financial success has accompanied the improved hospital service. The first year of operation showed a net gain of \$1,516. Admissions for 1952 totaled 1,042 as contrasted with the 700 patients admitted during the last year of operation for the old hospital.

Contents for June, continued

	Page
Reactor-produced radioactive isotopes—Radiation exposure in the United States-----	609
<i>Samuel C. Ingraham, II, James G. Terrill, Jr., and Dade W. Moeller.</i>	
Anthrax in the United States-----	616
<i>James H. Steele and Raymond J. Helvig.</i>	
The interest of public health in diabetes-----	624
<i>Malcolm J. Ford.</i>	
Tuberculosis mortality by State, 1950-----	628
Public Health Service emergency assistance in disaster relief-----	630
<i>Gordon E. McCallum and Harvey F. Ludwig.</i>	
A preventive medicine screening program in a venereal disease clinic-----	633
<i>Gerald J. Gruman.</i>	

Short reports and announcements:

Frontispiece . . . ii. PHS publications . . . 635. Achievements in public health, July 1, 1951-June 30, 1952—A review . . . 637. PHS staff announcements . . . 553. Reported tuberculosis morbidity and mortality . . . 557. Veterans' syphilis records . . . 562. In departmental periodicals . . . 577. PHR subscriptions . . . 582. Gamma globulin for poliomyelitis is distributed . . . 594. Anthrax epidemic in Paraguay . . . 623. Dr. Candau WHO Director-General . . . 634.



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	Page
Tuberculosis cases known to health departments----- <i>Robert J. Anderson, Herbert I. Sauer, and Roger L. Robertson.</i>	641
Twenty-six years of cancer control in Massachusetts----- <i>Herbert L. Lombard.</i>	647
Effect of Public Law 779 on teaching and research at public health schools----- <i>W. H. Aufranc and William P. Shepard.</i>	656
Immune serum globulin in the prophylaxis of paralytic poliomye- litis, measles, infectious hepatitis, and hypogammaglobulinemia--	659
The distribution and use of gamma globulin-----	660
Plan for the allocation of gamma globulin-----	666
Progress in research on poliomyelitis----- <i>Harry M. Weaver.</i>	669
The WHO Tuberculosis Research Office—A review of the first four years----- <i>I-Chin Yuan and Carroll E. Palmer.</i>	678
“New occasions teach new duties”----- <i>Hugh R. Leavell.</i>	687
A method of simplifying soil percolation tests for septic tank systems-- <i>Abraham Gelperin and Willard O. Fuller.</i>	693
1952 summary of foodborne, waterborne, and other disease out- breaks----- <i>C. C. Dauer.</i>	696
Protozoans in stools; unpreserved and preserved in PVA-fixative---- <i>Morris Goldman and Marion M. Brooke.</i>	703
Technical assistance for public health in the Republic of Indonesia-- <i>E. Ross Jenney.</i>	707

Continued ►

frontispiece . . .

The new Tuberculosis Infirmary for Negroes at Sanatorium, Miss., represents an important forward step in the State's effort to control and eventually wipe out tuberculosis. It adds 154 beds in a thoroughly modern plant (top right) built with the aid of Federal funds under the State plan which is a prerequisite to participation in the Hospital Survey and Construction Program.

Among new adjunct facilities designed to help attract and keep good personnel are the nurses' home (center), the duplex houses for staff (lower right), and a dormitory for maintenance workers.

Since housekeeping, administrative, and maintenance operations were already provided for in older buildings, space in the new main building is devoted

almost exclusively to patient care facilities. Perhaps the most striking feature from the clinical standpoint is the eight-bed postoperative unit which occupies a wing on the second floor. It is a self-contained nursing unit equipped to give the specialized nursing care indicated immediately following a major operation.

The layout of the building shows facilities which are used jointly for in- and out-patients and are located conveniently to both types of patients. Numerous aids to patient comfort and rehabilitation are provided, including an occupational therapy and recreation department well above the average. (R. W. Naef, West Jackson, Miss., was the architect.)

Contents for July, continued

	Page
Histoplasmin sensitivity in Mississippi—A new boundary----- <i>Robert M. O'Neal.</i>	714
Recipients of the master's degree in sanitary engineering—A quantitative study----- <i>Walter A. Lyon and Arthur P. Miller.</i>	717
Rapid method for distilling fluorides from water samples----- <i>R. E. Frazier and H. G. Oldfield.</i>	729
Legal notes on public health: Constitutionality of delegation of legislative powers to State boards of health-----	733

Short reports and announcements:

Frontispiece . . . ii. PHS films . . . 713. PHS publications . . . 734. Undersecretary of Health, Education, and Welfare . . . 655. Current readings on gamma globulin and poliomyelitis . . . 668. To the professional public health worker . . . 692. Federal food and drug laws violated . . . 695. PHS staff announcements . . . 728. In departmental periodicals . . . 732.



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
Nutrition research—Potentialities in chronic disease----- <i>William H. Sebrell, Jr.</i>	737
Enrichment—A public health approach to better nutrition----- <i>William H. Sebrell, Jr.</i>	741
Agglutination of <i>Treponema pallidum</i> in syphilitic serums----- <i>Charlotte P. McLeod and Harold J. Magnuson.</i>	747
American medicine in a changing society----- <i>Oveta Culp Hobby.</i>	756
Sex differences in the trend of mortality from certain chronic diseases-- <i>Gene Kaufman and Theodore D. Woolsey.</i>	761
Come-up time method of milk pasteurization----- <i>Denzel J. Hankinson, R. B. Read, Warren Litsky, and Robert R. Brown.</i>	769
Public health today—The Nation's best investment----- <i>Leonard A. Scheele.</i>	771
Half a century of international control of the venereal diseases----- <i>Theodore J. Bauer.</i>	779
U. S. birth statistics, January–April 1953-----	788
Incidence of reactions to antirabies horse serum----- <i>Thomas S. Hosty and Frank R. Hunter.</i>	789
Elements of a coordinated system of vital records and statistics----- <i>Halbert L. Dunn.</i>	793
Investigation of jute imports as potential plague source----- <i>Edgar W. Norris, Lewis B. Schneider, Leland J. Hanchett, Charles E. Kohler, and William F. Buren.</i>	802
Public, professional, industrial allies in sanitation----- <i>Mark D. Hollis.</i>	805
The value of good service statistics in a modern health department--- <i>Evelyn Flook.</i>	811

Continued ►

I proudly dedicate this center to medical research as a symbol of our national concern for the health of our people, for their right to pursue happiness unhampered by crippling pain and illness.

In freedom, this building and the people who work here are dedicated to the endless struggle against human suffering.

We are dedicating it today—dedicating it to the open mind of research—dedicating it as an example of democracy heeding its obligation to free men, who, together, are self-governing.

—OVETA CULP HOBBY

WITH these words the Secretary of Health, Education, and Welfare on July 2, 1953, added a major resource to the public health and medical research potential of the United States of America.

Creation of the Clinical Center of the National Institutes of Health—research arm of the Public Health Service in the Department of Health, Education, and Welfare—is the latest in a train of developments which began in 1887 with the organization of scientific research endeavor by the then United States Marine-Hospital Service. In succeeding years, the focus of research was on major communicable diseases, and the methods were largely field epidemiology and laboratory study, basic and applied. The new Clinical Center permits an across-the-board approach via field, laboratory, and clinical routes. It facilitates, also, a coordinated effort against today's major and disabling diseases. "We have reached," Surgeon General Scheele said at the Clinical Center dedication, "a period of consolidation of forces for a broad attack on chronic diseases—an attack that can be fully successful only after years of intensive research. This means that we must not only press the search for new knowledge, but we must also use what we do know more intensively, more effectively."

Public Health Reports for September will report more fully on the dedicatory remarks of the Secretary and others and will present additional detail about the research program. For a description of the general philosophy and operating plans of the Clinical Center, see Public Health Reports, August 1952, pp. 819-823.

frontispiece . . .

The southern elevation of the Clinical Center is marked by the patients' solariums, with the silhouette of the auditorium jutting from the first floor.

Contents for August, continued

	Page
Health education via television—"Your Family Doctor" in Baltimore— Joseph Gordon.	816
Diabetes mortality by State for 1950_____	822
Rat-resistant construction materials_____	824
Short reports and announcements:	
Dedication of Clinical Center . . . ii. In departmental peri- odicals . . . 760, 792. Staff announcements . . . 777. PHS films . . . 778. Legal notes on public health . . . 825. PHS publications . . . 826. Ideas . . . 828.	
Venereal disease postgraduate course_____	755
State and Territorial health officers' conference_____	759
Closing of two PHS hospitals_____	768
Applicants for cancer research grants_____	770
Municipal sewage treatment plant construction_____	791
Assistants to the Secretary appointed_____	801
Dining car sanitation award_____	810
Training courses in VD control_____	821
Environmental health training course_____	823

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 11 . . . The resistance of
construction materials to penetration by rats.

C. M. Tarzwell, R. L. Stenborg, H. P. Nicholson, and
W. D. Lynn.

16 pages and illustrations. A summary and information on availability appear on p. 824.



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	Page
Servicio_____	829
From the Surgeon General's foreword_____	830
From the IIAA president's introduction_____	830
Genesis and general structure_____	832
Assessment viewpoints and procedures_____	837
Use of anthropological methods and data in planning and operation_____	841
Polluted air, a growing community problem_____	858
<i>Henry N. Doyle.</i>	
Air pollution and man's health_____	868
In Great Britain_____	868
<i>Peter C. G. Isaac.</i>	
In Detroit_____	870
<i>Benjamin Linsky.</i>	
In Los Angeles_____	872
<i>Gordon P. Larson.</i>	
The teaching-learning situation_____	875
<i>Gordon W. Allport.</i>	
The development and evaluation of cancer diagnostic tests_____	880
<i>John E. Dunn, Jr., and Samuel W. Greenhouse.</i>	
A review of pollenosis and the role of weeds_____	885
<i>W. C. Spain.</i>	
Professional education in public health—A survey of schools of public health, 1950_____	890
<i>Harold S. Diehl.</i>	
The U. S. Public Health Service Clinical Center_____	897
The Clinical Center structure_____	901
Dedication addresses:	
"A symbol of our national concern for the health of our people." <i>Oveta Culp Hobby.</i>	904
"We must press the search for new knowledge . . . use what we know more effectively"_____	907
<i>Leonard A. Scheele.</i>	

Continued ►



The spirit of the cooperative efforts of the United States of America and its sister nations to the south toward health and stability is epitomized in the language of the plaque, shown above, on the wall of the *Serviço Especial de Saúde Pública* hospital at Breves in the Amazon region of Brazil. The inscription under the initials M. E. S. (Ministry of Education and Health) reads:

*Special Services of Public Health
This building, symbol of the political understanding of good neighbor, was constructed by the governments of the United States of Brazil and of the United States of America*

Over the past 11 years, such expressions of mutual understanding have been repeated many times in many countries of Latin America, commemorating the health activities developed jointly by our own Institute of Inter-American Affairs and the ministries of the other American Republics. Some of these activities were described in *Public Health Reports* for April 1952, pp. 351-357. Beginning on page 829 of this issue, excerpts from the Public Health Service's evaluation, requested by the Institute of Inter-American Affairs, of the first 10 years of these international health undertakings are presented.

frontispiece . . .

In the upper photograph a visiting nurse is making her rounds among the families of La Paz, Bolivia. She was trained by and works for SCISP (*Servicio Cooperativo Interamericano de Salud Público*). At left, below, a nurse in a health center at Bogotá, Colombia, advises a mother and children on health maintenance. At right is a typical public fountain installation of a cooperative water supply project at Croix-des-Bouquets, Haiti.

Contents for September, continued

	<i>Page</i>
Clinical Center dedication addresses, continued:	
"An atmosphere of excitement, of high expectation and a knowledge . . . of serving mankind"----- <i>William H. Sebrell, Jr.</i>	908
Health department manpower-----	909
Trends in tuberculosis mortality in continental United States----- <i>Albert P. Iskrent and Eugene Rogot.</i>	911
Short reports and announcements:	
Special services of public health-----	ii
New Foreign Operations Administration-----	840
PHS staff announcements-----	874
Dr. Keefer health adviser to the Secretary-----	889
Assistant Secretary appointed-----	896
Consolidation of PHS regional offices-----	919
Technical publications-----	920

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 12 . . . Evaluation of cancer diagnostic tests.

52 pages and illustrations. An interpretive paper and information on availability appear on page 880.

PUBLIC HEALTH MONOGRAPH No. 13 . . . Staffing of State and local health departments, 1951.

Jack C. Haldeman, Bess A. Cheney, and Evelyn Flook.

56 pages and illustrations. A summary and information on availability appear on pages 909-910.



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
Tuberculosis: A time for decision----- <i>Thomas Parran.</i>	921
Treatment of tuberculosis----- <i>J. Burns Amberson.</i>	928
International certificates of vaccination-----	932
Distribution of hospital nursing services----- <i>Helen G. Tibbitts.</i>	933
Occupational disease reporting----- <i>Victoria M. Trasko.</i>	940
Report of a case of rat-bite fever due to <i>S. moniliformis</i> ----- <i>Robert L. Griffith and Donald W. McNaughton.</i>	947
Sanitary quality of crushed and cubed ice as dispensed to the consumer----- <i>V. D. Foltz.</i>	949
State laws on financing and staffing local health departments----- <i>Clifford H. Greve and Kathryn J. Connor.</i>	955
Unfinished business and new forces in environmental health ortho- doxy ----- <i>Abel Wolman.</i>	962
The public health laboratory—Yesterday, today, and tomorrow---- <i>Albert V. Hardy.</i>	968
Cancer morbidity studies in metropolitan areas-----	975
Mapping a program of public health for Ethiopia and Eritrea----- <i>Henry R. O'Brien.</i>	976
Epidemiological study of plantar warts among school children----- <i>Walter K. Grigg and Gertrude Wilhelm.</i>	985
A program for protection of research employees against pathogenic hazards ----- <i>James Black, John M. Lynch, and Irving Ladimer.</i>	989
Frequency of accidents as recorded in family surveys-----	993

Elements of Occupational Health Programs

An international group of experts jointly convened by the International Labor Organization and the World Health Organization in Geneva in 1950 agreed that "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment, and, to summarize: the adaptation of work to man and of each man to his job."

A second report of the group deals broadly with measures of general health protection of workers in places of employment, notification of occupational diseases, organization of health service programs in large and small plants and agricultural enterprises, and methods of cooperation between public health and industrial health services.

Recognizing that effective action requires "close cooperation with community health agencies working on parallel problems," *nutrition* of workers is seen as a concern of occupational health. Education not only of workers but of the housewife who prepares his meals is underscored. In the matter of *communicable disease control* the general objective everywhere is to detect cases and render them noninfectious. "This objective is especially important in industry, not only because there are hazards of infection of large numbers of persons in the working environment, but also because the place of employment provides valuable opportunities for the finding, treatment, and rehabilitation of cases."

Among *maternal and child health* considerations, "the protection of the health of pregnant women who are employed is of the first importance." The objective of *mental health* activities

is "to promote the health and happiness of people at work" and the way to do it is "not the provision of psychiatric services, but the planning of work tasks and patterns of industrial organization which do not run counter to human emotional needs."

Environmental sanitation is important for the prevention of spread of disease by water, food, air, or other means, and for avoiding the creation by industry of sanitary hazards for the surrounding community. *Health education* is a basic need, since "the effectiveness of all health service activities is directly related to the understanding and knowledge of the workers." *Nursing services* in the community "should be closely related to the medical service of the plant."

The general objective is to coordinate the official and unofficial services "so as to accomplish the largest volume of public health effort at a minimum expense to the community," such programs providing for "the complete cooperation on the local level of all the agencies having a bearing on the health of the worker."

—Joint ILO/WHO Committee on Occupational Health, Second Report. World Health Organization Technical Report Series, No. 66, July 1953.

frontispiece . . .

The insets symbolize the fact that research and service are two sides of the same coin of occupational health. New processes in industry produce new health problems requiring imaginative investigations. New developments in the medical and related sciences offer means of attacking old as well as new problems more effectively. In the September issue of Public Health Reports trends in air pollution control were examined. This month, the matter of occupational disease reporting is explored (page 940). Succeeding issues will report on other elements of occupational health, especially those relating to community and public health relationships.

Contents for October, continued

	Page
Trend of multiple cases of poliomyelitis in household units..... <i>Morris Siegel and Morris Greenberg.</i>	996
National evaluation of gamma globulin.....	1001
Servicio:	
Organization and administration of bilateral public health pro- grams in Latin America.....	1002
The Servicio as an administrative device.....	1008
1952 provisional data indicates decline in tuberculosis mortality.....	1013
Milk sanitation honor roll for 1951-53.....	1015
Short reports and announcements:	
Elements of occupational health programs and frontispiece . . . ii. PHS staff announcements . . . 954. Ideas . . . 961. PHS ex- hibits . . . 984. Publications . . . 1019.	
Institute for Federal hospital administrators.....	931
Amyotrophic lateral sclerosis.....	974
Grain sanitation committee organized.....	992
Medical research fellowships and grants.....	995
Medical practitioner committee on gamma globulin.....	1000
United Nations Day.....	1012

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 14 . . . Accident frequency, place
of occurrence, and relation to chronic disease.
Selwyn D. Collins, F. Ruth Phillips, and Dorothy S. Oliver.
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995.



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Published since 1878

Contents

	<i>Page</i>
Gamma globulin in a poliomyelitis outbreak, Montgomery, Alabama, 1953.....	1021
<i>D. G. Gill.</i>	
Organizing mass gamma globulin clinics in three North Carolina counties.....	1025
<i>Charles M. Cameron, Jr.</i>	
Poliomyelitis distribution in the United States, 1952.....	1033
<i>C. C. Dauer.</i>	
Case finding through multiple screening.....	1035
<i>Arnold B. Kurlander and Benjamin E. Carroll.</i>	
Psychiatric rehabilitation in the hospital.....	1043
<i>Richard H. Williams.</i>	
Industrial sickness absenteeism rates for specific causes in 1952 for the year and last two quarters.....	1052
<i>W. M. Gafafer.</i>	
Economic benefits of malaria control in the Republic of Indonesia.....	1056
<i>Warren A. Ketterer.</i>	
Glaucoma case finding in Philadelphia.....	1059
<i>Emily K. Hankla.</i>	
Disinfecting garbage in truck bodies by direct steam injection.....	1065
<i>Herbert A. Bevis, Frank Tetzlaff, and Floyd B. Taylor.</i>	
Simplifying State accounting for Federal health grants.....	1071
<i>Paul E. Fox and Daniel I. Zwick.</i>	
Nature and purpose of local health unit record and report systems.....	1078
<i>Olive G. Johnson.</i>	
The growth of local health units in Florida.....	1083
<i>Wilson T. Sowder.</i>	
Birth and early days of Florida's first county health unit.....	1088
<i>W. H. Y. Smith.</i>	
Public health aspects of civil defense.....	1091
<i>Dale C. Cameron.</i>	
Water, sewage, and industrial waste research trends and needs.....	1099
<i>Alfred H. Wieters and Leonard B. Dworsky.</i>	
Environmental health in a rural economy.....	1107
<i>Mark D. Hollis.</i>	

Continued ►

The Scientific Team in Cardiovascular Research

The early disciples of Koch and Pasteur made significant advances using individual skills alone. Research today, however, looks to teamwork for the most consistent progress.

The "lineup" against the heart diseases, for example, may include investigators from many different disciplines, such as:

Anatomy	Hematology	Physical biology
Biology	Industrial hygiene	Physics
Biostatistics	Microbiology	Physiology
Chemistry	Nutrition	Psychiatry
Electrocardiography	Pathology	Rehabilitation
Electronics	Pharmacology	Roentgenology
Epidemiology	Physical anthropology	Social anthropology

At Public Health Service's National Institutes of Health, the research team of the National Heart Institute laboratory of chemical pharmacology calls upon many different skills in studying the fate of drugs in the body. Here the observations of the basic chemical and physical sciences are blended in developing methods for the estimation of drugs such as the barbiturates, local anesthetics, narcotic analgesics, dicoumarin-type anticoagulants, anti-inflammatory agents, sympathomimetic amines, and adrenergic blocking agents.

Electronic instruments, such as the spectrophotometer, may aid in measuring quickly and accurately as little as a millionth of a gram of a drug in a few drops of blood.

Involved in this laboratory and clinical study are biochemists, pharmacologists, physiologists, nurses, physicians, rehabilitation workers, roentgenologists, and others. Investigators may employ methods as old as science, along with modern radiochemistry. In the latter, the isotope labeling technique has been successfully applied, for example, to study the complete fate of pentobarbital in the body.

The goal in these studies is to find how certain drugs may be administered for maximum therapeutic effect, and to develop clues to more effective compounds, with blueprints for the synthesis of some of these. Chemical pharmacology is but one of the areas where research teamwork is advancing public health.

frontispiece . . .

In the upper left photograph, a doctor, studying under the research fellowship program of the National Heart Institute, observes the Van Slyke method of measuring the amount of gas present in blood samples. At upper right, investigators at the National Heart Institute laboratory of chemical pharmacology prepare apparatus for recording changes in blood pressure that result from use of experimental drugs. In the center, a young laboratory technician adjusts the chemical apparatus. At lower left, two research scientists discuss a cut-away model of the heart, while interpreting graphic findings related to heart physiology. At lower right, an investigator tests an experimental method of recording density changes and motions of the heart revealed by the electrokymograph.

Contents for November, continued

	Page
Services of preventive medicine to an observed population.....	1115
Final 1952 report on tuberculosis morbidity, United States and Territories	1116
Membrane filter procedure applied in the field.....	1118
<i>Edmund J. Laubusch, Edwin E. Geldreich, and Harold L. Jeter.</i>	
Servicio:	
Demographic characteristics of Latin America.....	1123
Disease and nutritional barriers to health.....	1127
Principles of public health program planning and their application in Latin America.....	1132
Short reports and announcements:	
Scientific team in cardiovascular research and frontispiece . . .	
ii. PHS staff announcements . . . 1090, 1122. From <i>The Child</i> . . . 1131. Technical publications . . . 1139.	
<i>Excerpta Medica</i> adds new cancer section.....	1024
Dr. Brownell named Commissioner of Education.....	1051
Departmental council formed to aid Secretary.....	1064
Children's Bureau studies childhood accidents.....	1070
Juvenile delinquency rate increase.....	1077
Process for extracting andromedotoxin.....	1098
Dr. Meister wins 1954 chemistry award.....	1106
1,300 projects completed in hospital program.....	1116
Training courses in prothrombin time determinations.....	1140

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 15 . . . Records and reports of local health departments.

Olive G. Johnson.

89 pages and illustrations. A summary and information on availability appear on pages 1078-1082.

PUBLIC HEALTH MONOGRAPH No. 16 . . . Dental, eye, and preventive medical services.

Selwyn D. Collins and F. Ruth Phillips.

28 pages and illustrations. A summary and information on availability appear on pages 1115-1116.



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PUBLIC HEALTH REPORTS

Published since 1878

Contents

	<i>Page</i>
The occurrence of influenza in the United States, 1952-53----- <i>Dorland J. Davis and Carl C. Dauer.</i>	1141
New orientation in the teaching of preventive medicine----- <i>W. Palmer Dearing.</i>	1147
Experiments in the control of schistosomiasis in Brazil----- <i>Willard H. Wright and Charles G. Dobrovolsky.</i>	1156
Sanitation problems in a suburban area—Jackson County, Missouri-- <i>Jack K. Smith.</i>	1161
Coxsackie virus antibody and incidence of minor illness during the summer----- <i>Mary Walton and Joseph L. Melnick.</i>	1167
Isolation of a Coxsackie virus during a summer outbreak of acute minor illness----- <i>Joseph L. Melnick, Mary Walton, and Ira L. Myers.</i>	1178
Research preferences and activities of Public Health Service officers-- <i>Sidney H. Newman and Margaret A. Howell.</i>	1183
Studies on dental care services for school children—First and second treatment series, Woonsocket, R. I.----- <i>Frank E. Law, Carl E. Johnson, and John W. Knutson.</i>	1192
Record and report systems in local health departments—A sym- posium -----	1199
Simplifying local service records----- <i>Alpha K. Kenny.</i>	1200
Coordinating medical and nursing records----- <i>L. A. Dickerson.</i>	1205
Reexamining health record forms----- <i>Edward W. Colby.</i>	1209
Curbstone consultation: An effort to improve communications at annual meetings:	
I. Origins of the APHA Southern Branch experiment----- <i>Ben Freedman.</i>	1213
II. Three years' experience with curbstone consultation----- <i>William P. Richardson.</i>	1217
The partnership in dental health----- <i>Nelson A. Rockefeller.</i>	1221

Schistosomiasis

The parasitic worms which cause schistosomiasis, a chronic disease present in about 114 million individuals throughout the world, follow a complex life cycle, illustrated on the frontispiece. The disease is particularly widespread in areas of the world with low standards of sanitation. In some areas of Egypt, for example, 90 percent of the population suffers from schistosomiasis, and the productive potential of the nation is estimated to be lowered one-third.

The worms responsible for the disease are commonly known as blood flukes. They inhabit veins of the abdominal cavity and pelvis. The eggs extruded by the female worms penetrate various tissues and may find their way to all or nearly all organs of the body, where they cause inflammatory reactions and interfere with normal body function.

Various attempts to control schistosomiasis have included improved sanitation, mass chemotherapy, and attack on the snail intermediate hosts. The latter measure is one of the most promising, and in recent years attention has been focused on new chemicals which might be more effective. In many areas, transmission of the disease is intimately linked with age-old agricultural and religious practices, which are difficult to change. This, plus the fact that there is no satisfactory treatment for the disease, points to control of the snail hosts as one of the most promising approaches to the problem.

A debilitating affliction which often makes its victims too sick or too weak to work, schistosomiasis runs a chronic course which may extend over many years. Death may result from cumulative damage to vital organs.

During the last few years, chemicals which have proved effective in snail eradication experiments in the laboratory have undergone extensive field tests in various parts of the world by scientists of the laboratory of tropical diseases in the National Institutes of Health of the Public Health Service. One such project was set up in Recife, Brazil, in cooperation with the Pan American Sanitary Bureau and Brazil's Ministry of Education and Health. This work is reviewed by Wright and Dobrovolsky on p. 1156 of this issue of *Public Health Reports*.

Contents for December, continued

	Page
Agenda for a critical exploration of current problems in medical care— <i>E. M. Bluestone.</i>	1225
Psychiatric rehabilitation in the community----- <i>Richard H. Williams.</i>	1231
The literature of rehabilitation of mental hospital patients-----	1237
An analysis of ratbites in Baltimore, 1948-52----- <i>William Sallow.</i>	1239
Servicio:	
Programs and problems in professional education and inservice training of health personnel-----	1243
Development of environmental health programs-----	1251
Health education in principle and practice-----	1258
Short reports and announcements:	
Life cycle of <i>Schistosoma mansoni</i> . . . frontispiece. Schistosomiasis . . . ii. PHS advisory councils . . . 1191 PHS staff announce- ments . . . 1230. From <i>The Child</i> . . . 1238. Technical publica- tions . . . 1263.	
Labeling salt in food-----	1146
Increase in social insurance recipients-----	1155
<i>Cancer control letter</i> discontinued-----	1236
Municipal sewage treatment plant construction-----	1242
Public Health Reports index for 1953-----	1250
Public health developments in Liberia-----	1257

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 17 . . . Rehabilitation of
mental hospital patients. Review of the literature.

Charlotte Green Schwartz.

76 pages. A summary and information on availability appear on pages 1237-1238.



spectator's reason for saying this. Recently, I have had occasion to dig into the story of public health in the past hundred years. As I picked up one thread after another and began to ravel it back to its origins, I found that Professor Winslow had been there before me as historian, as scientist, administrator, teacher, as prophet or philosopher.

Following such a leader, I find it difficult to bring you any original concepts of public health statesmanship. Nor does the subject lend itself to the closely reasoned development of a single theme, as would some technical aspect of public health. We are dealing instead with a kaleidoscope—the kaleidoscope of public health in the modern world. The same bits and pieces of modern society present themselves to us in an endless variety of patterns and problems. Our reflections, then, will be kaleidoscopic.

There is another difficulty. To discuss statesmanship is to discuss a human function. And it is a function fraught with the resolution of dilemmas, the making of decisions, and the exercise of wisdom, dedication, and leadership. These virtues are possessed in varying degree and are exercised consistently only by the uncommon man. Yet we of the public health profession must reflect upon statesmanship, must discuss it, and exercise it to the highest degree of which we are capable. For this is a period of history in which public health progress depends more upon the quality of our statesmanship than upon the specificity of our techniques.

I do not mean that our techniques are adequate to the solution of all our problems; nor that public health can relax for an instant its scientific effort for the discovery and development of better methods. Far from it. Nearly a century of organized public health work has proved the direct correlation of success with scientific advance and its resultant specificity of techniques. As public health progress has been based primarily upon the professional application of the biological and mechanical sciences in the past, so it will be in the future.

Nevertheless, the tide of events runs strongly in directions that should alert us to the challenge of statesmanship. America has entered a period of social evolution unlike any we have experienced hitherto.

The most obvious, and perhaps most potent,

difference is America's position of leadership in the free world—a leadership which carries heavy responsibilities affecting every phase of our society and economy. It has not been easy for us to endure with patience the effects of prolonged mobilization. It has not been easy for us to accept the urgency of our defense problems or to learn the art of persuading other peoples to the benefits of mutual security and the principles of democracy. These are new experiences for us; yet they are essential for survival in a world threatened by Soviet imperialism.

Socioeconomic Elements

The economy itself is working in unfamiliar directions. I say "unfamiliar" because many people forget that the depression of the thirties is 20 years behind us, and that the pattern for solution of public health problems in the future is likely to be different from that of the past 20 years. Reasonable pressure for economy in governmental health programs is one of those forces that "flow like a tide over communities only half conscious of that which is befalling them." This will constitute a major challenge to our statesmanship. Public health programs will grow; but we must study needs, set priorities, plan better, and work harder.

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The effects of these broad socioeconomic changes on public health are manifold, exceedingly complex, and ramiform. We may think

Contents for December, continued

	Page
Agenda for a critical exploration of current problems in medical care_ <i>E. M. Bluestone.</i>	1225
Psychiatric rehabilitation in the community_____ <i>Richard H. Williams.</i>	1231
The literature of rehabilitation of mental hospital patients_____ An analysis of rabbits in Baltimore, 1948-52_____ <i>William Sallow.</i>	1237 1239
Servicio:	
Programs and problems in professional education and inservice training of health personnel_____ Development of environmental health programs_____ Health education in principle and practice_____ Short reports and announcements:	1243 1251 1258
Life cycle of <i>Schistosoma mansoni</i> . . . frontispiece. Schistosomiasis . . . ii. PHS advisory councils . . . 1191 PHS staff announce- ments . . . 1230. From <i>The Child</i> . . . 1238. Technical publica- tions . . . 1263.	
Labeling salt in food_____	1146
Increase in social insurance recipients_____	1155
<i>Cancer control letter discontinued</i> _____	1236
Municipal sewage treatment plant construction_____	1242
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LEONARD A. SCHEELE, *Surgeon General*

Public Health Statesmanship

By LEONARD A. SCHEELE, M.D.

I HAVE NOT the slightest hesitancy in announcing that I have plagiarized the title of this lecture: Public Health Statesmanship. It seems fitting, however, to inaugurate the Winslow Lectures with some reflections on this quality, this profession, this art of statesmanship—because Professor Winslow himself has exercised it in thought, word, and deed throughout his career.

In a symposium on Public Health Statesmanship at the University of Pennsylvania Bicentennial Conference in 1941, a symposium in which Professor Winslow participated, Dr. Parker Hitchens (1) quoted an unidentified passage which I wish to propose as the text of our discussion:

"History shows that great economic and social forces flow like a tide over communities only half conscious of that which is befalling them. Wise statesmen foresee what time is bringing and try to shape institutions and mold men's thoughts and purposes in accordance with the change that is silently coming."

This description of statesmanship gives us a good plumbline for our discussion. Note how it views the statesman as an embodiment of creative thought and action. Even the metaphor brings to mind a creative personality—

Dr. Scheele is Surgeon General of the Public Health Service. This paper, the first Charles-Edward Amory Winslow Lecture, was delivered at Yale University on November 14, 1952.

the potter, guided by his vision, shaping and molding the clay.

This description also asks us to ascribe historical perspective to the statesman as one of his essential qualities. And, finally, it gives a central position in the arena of statesmanship to the economic and social forces which ultimately shape the course of events.

Criteria of Statesmen

Creativity—historical perspective—and recognition of economic and social change: We need especially to emphasize these criteria in our consideration of statesmanship in public health. The members of the public health profession come from many scientific disciplines. As professional workers, we tend to place the highest values on our technical knowledge and skills. But as statesmen, we are challenged to be something more than good technicians.

As technicians, we are called upon day after day to apply our special competence to problems of bewildering complexity. As statesmen, we are challenged to learn whence these problems sprang, to trace their deep, far-reaching roots, and to learn how other men have viewed the health problems of their day. In public health, each man's sphere of direct action may be narrow—confined by the limited reach of his individual technology. As statesmen, we are challenged to see the inseparability of our sphere from the countless interacting forces of society—and, having seen, to think and act as statesmen.

Professor Winslow's response to this challenge is woven into the fabric of public health throughout the world. I have more than a

spectator's reason for saying this. Recently, I have had occasion to dig into the story of public health in the past hundred years. As I picked up one thread after another and began to ravel it back to its origins, I found that Professor Winslow had been there before me as historian, as scientist, administrator, teacher, as prophet or philosopher.

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difference is America's position of leadership in the free world—a leadership which carries heavy responsibilities affecting every phase of our society and economy. It has not been easy for us to endure with patience the effects of prolonged mobilization. It has not been easy for us to accept the urgency of our defense problems or to learn the art of persuading other peoples to the benefits of mutual security and the principles of democracy. These are new experiences for us; yet they are essential for survival in a world threatened by Soviet imperialism.

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The effects of these broad socioeconomic changes on public health are manifold, exceedingly complex, and ramiform. We may think

of public health as a state of community well-being or as an institution created by society to protect and promote that state of well-being. Actually, it is both; but however we think of it, we are bound to recognize a continuously interacting relationship between the health of the people and the economy; and a similar reaction between public health practice and the society in which it functions. These interacting relationships determine in large measure the nature of our problems.

I have mentioned the kaleidoscopic patterns in which those problems present themselves. Yet there is an order and a unity of purpose in public health work which make it the great institution it is and which enable its disciples to serve the environing society with compassion, with dedication, and with a sense of partnership.

To understand this motivation, we do best to turn to a classic definition of public health which was formulated by Professor Winslow in 1920 and which has been so widely disseminated that it may now be called the charter of modern public health:

"Public health is the science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts—for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene—the organization of medical and nursing services for the early diagnosis and preventive treatment of disease—and for the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health" (2).

Thirty-two years later, the Expert Committee on Public Health Administration of the World Health Organization adopted this definition as the basis of their discussions—with two minor changes which have a distinct Winslow flavor (3). They recognized an expanded concept of health education and changed "personal hygiene" to "personal and community health." Here at Yale, public health found

the early expression and practice of this modern concept of community health organization and education, as well as many of its first recruits to the new group of health educators trained in that concept.

The WHO committee also added this phrase: "so organizing those benefits as to enable every citizen to realize his birthright of health and longevity." We hear in those words the echo of many a plea by Professor Winslow for a higher level of health than the absence of disease and for the universal application of public health benefits.

In our charter, then, public health workers may find many opportunities for statesmanship both in our most familiar programs and in those less familiar. Let us consider a few of them.

Environmental Health

Control of environmental hazards is one of the oldest public health functions. With a few notable exceptions, which I shall refer to later, that effort has been directed to the prevention of communicable diseases. Many of the traditional sanitary practices of public health are now quite commonplace. In fact, they are too much taken for granted. Yet as they developed, in their time, many a public health pioneer, a public health statesman, fought uphill battles against ignorance and fear to gain better understanding and acceptance of public health practice in the community.

Americans are living in an environment quite different from that of 50 years ago—or, for that matter, even 10 years ago. Public health can no more ignore this new environment as a possible source of ill health than our professional ancestors could ignore the environment of their times as a source of devastating epidemics. Moreover, we now think of the environment in a wider dimension—to include social and psychological factors along with the physical. The incidence of fatal and disabling accidents, for example, calls for the study of all these factors. The relationships of environment with mental health and such chronic ailments as heart disease, cancer, arthritis, and rheumatism also must be investigated.

Public health statesmanship requires that we recognize the health components in the new

environment. Often they go unchallenged, not only by the persons directly concerned with creating new environmental situations, but also, regrettably, by public health personnel.

The Chemical Environment

None of us, for example, can escape the influence of chemicals on our daily living. For the most part, that influence has been beneficial to a high degree. But in the field of public health, we are beginning to see clouds upon the horizon, literally. The problem of air pollution is no longer confined to our work places or to our largest industrial centers, but is a potential threat to health even in semirural communities where industries, domestic heating systems, and climatic conditions combine to produce serious "smogs."

It is significant to our reflections on public health statesmanship that in 1912 the New York State Commission on Ventilation, of which Professor Winslow was a distinguished member, was appointed by the governor at the request of the New York Association for Improving the Condition of the Poor. The association put up \$50,000 for the work of the commission, especially in investigations of the relation of ventilation in tenements and schools to ill health.

In 1949, it was a local labor union that requested the Public Health Service to make a thorough study of the smog in Donora, Pa. Since that time, a number of community organizations have sought help in studying their air pollution problems.

Is it a measure of public health statesmanship that 40 years ago and again 3 years ago, it was not the official health agencies, but members of the society in which they function, who sought action in studying the health component of air pollution? If public health workers do not see beyond the performance of their prescribed routines; if they do not recognize the health implications of the new environment nor bestir themselves to interpret the problems to society, then we can say that their statesmanship in environmental health does not measure up.

Public health knowledge of chemical and radiation hazards began with the study and control of occupational diseases. Today the number of known substances, compounds, and

processes used in industry runs into the thousands and is being increased day by day. To what extent the industrial uses of chemicals and radioactive substances affects the health of the general population is not known with anything like the specificity of our knowledge of occupational hazards.

The addition of chemicals to many processed foods and the development of new physical techniques for the preservation and transportation of foods also require study. The Select Committee of the House of Representatives to Investigate the Use of Chemicals in Foods and Cosmetics held extensive hearings in the 82d Congress and it is clear from the committee's report that more research is needed to determine the effects of chemicals in foods on human health. It is not clear, however, what the relationships between government and industry should be in the conduct of such research and in the formulation and enforcement of standards. Here is another instance in which statesmanship is, at the present time, more important for solution of the problems than the specificity of existing science.

Water Resource Problems

The pollution of our inland waters by industrial wastes is one of the largest domestic problems facing this country. It involves our total economy and is a present threat to industrial expansion, agriculture, recreation, fish and wildlife, and public health. We are still far from understanding the new types of pollution, as well as from solving this growing problem. During the past 4 years, the Public Health Service has worked with State and interstate water authorities and industrial groups to stimulate research. We are cooperating also with the Atomic Energy Commission in studies of the disposal of radioactive wastes. The current work, however, on both chemical and radioactive pollutants is only a small beginning of what is destined to become a large field of public health research and control.

Statesmanship in this field requires involving all the interested groups. For public health workers, it also provides a fine opportunity not only to interpret the health component in water pollution to persons primarily concerned with some other problem, but also to recognize and

The Winslow Lecture

Dr. C.-E. A. Winslow (right) and Dr. Ira V. Hiscock (left), chairman of the department of public health at Yale, with Dr. Scheele on the occasion of the first of the annual lectures sponsored by the Yale public health alumni in honor of Professor Winslow.

Dr. Winslow is the Anna M. R. Lauder professor emeritus of public health at Yale and editor of the *American Journal of Public Health*. After training with Sedgwick, and with wide experience, he joined the Yale faculty in 1915 as chairman of the department of public health, retiring in 1945 after 30 years of service, during which he achieved international recognition as leader, teacher, and exponent of public health. In 1942 he received the Sedgwick Memorial Medal of the American Public Health Association "for distinguished service in public health." In 1952 he received a special Lasker Award from the Association, and the World Health Organization conferred upon him the Leon Bernard Foundation prize.



interpret the common interest of many diversified groups in the development and conservation of the Nation's water resources.

One of the valuable lessons we have learned is the greater efficiency of a team approach to the water resources problem. The team that public health statesmanship seeks, of course, is not a group composed solely of collaborating Federal agencies, but rather a group in which State agencies and others are fully participating members.

I cannot leave the problems of our chemical environment without reference to the fluoridation of public water supplies as a means of preventing dental decay. This is probably the first and only instance in public health to date in which a "mass sanitation" technique has been developed for the prevention of a noncommunicable disease.

The epidemiological studies of fluorine in natural water supplies and of artificial fluoridation have been classics. We in the Public Health Service have every reason to be proud of the work of some of our men in this field. Time will prove that this single discovery and development has been one of the great contributions to human health.

Like all innovations, fluoridation has met

with resistance. And it is this very resistance that calls for statesmanship. In responding to something new, people forget facts long since accepted. They forget, for example, that fluorine exists in small amounts in many animal and plant tissues such as are found in the average diet, as well as in many natural waters. We have had varied reactions, from enthusiastic acceptance to uncertainty about the ingestion of fluorine, and even unfounded fear of "poisoning" similar to the early fear of the chlorination of water supplies.

Our statesmanship here consists in convincing the skeptics that our epidemiological and laboratory studies are valid and that the benefits of fluoridation are not to be discarded lightly in the face of uninformed opposition. Convincing is an art, and it permits no arrogance or contempt of the opposition's point of view. In convincing, we must be completely candid and interpret the needs for more research in this field. One of the core facts of public health is the continuous search for techniques even more effective than those which we can endorse wholeheartedly at a given time. This is one of the most difficult facts to interpret to the average citizen and to appropriating bodies; yet this

task of interpretation is the very substance of our statesmanship.

Healthful Housing

There is one other environmental factor which as much as any other affects the solution of health problems as diverse as the control of heart disease, the promotion of mental health, and the prevention of acute infections. I refer to housing.

As Professor Winslow knows so well, as he has told us so many times, it is not enough that the American Public Health Association through his leadership has developed a remarkably accurate technique for evaluating the healthfulness of urban housing. Here is an instance in which the effectiveness of our techniques has exceeded the quality of our statesmanship.

Housing has been a major social problem of high priority throughout the world since before World War II. There has been tremendous enthusiasm and hope that housing and health agencies united could make substantial contributions to the solution of far-reaching problems affecting every family in the Nation. Yet few health departments have accepted their share of responsibility in working for more healthful housing.

At the present time, only 10 State health departments are actively assisting local health agencies in the development of housing programs. A few others have specific plans. Nearly 100 local health departments, however, have actively taken part in programs to improve housing conditions in the past few years. Only 13 States and 25 local health departments are conducting active programs in home accident prevention—closely related to housing. In States where progress has been made in either field, the responsibility for stimulating and assisting local activity has been delegated clearly to one staff member.

Statesmanship in the health aspects of housing calls for the active participation of local health agencies in community planning and the development of community housing programs. The fact that a city may have anywhere from 2 to 10 official agencies concerned with some phase of housing intensifies the challenge to be a public health statesman. The fact that some

States have official housing agencies invites State health authorities to step across the street and make known their interest and their willingness to cooperate in joint solutions of a major social problem.

Disease Control and Health Services

It is indeed a part of public health statesmanship to reach out in the community and identify those social and political forces that will make common cause with us for the solution of health problems whatever they may be. I warrant that many a public health worker in State and local agencies today would be agreeably surprised at the diversity and strength of the groups ready and eager for his leadership.

In this connection, we need to help our boards of health and county councils develop public health statesmanship attuned to society's current problems. Public health workers read, talk, and listen to seemingly endless conferences all emphasizing the shift in the age composition of the population, the increase in chronic diseases and impairments, the needs for community facilities and for the mobilization of community health resources. I regret to say that much of this healthy exchange of information is between those already converted to the cause; and in rare moments of discouragement I wonder how much of the discussion goes in one ear and out the other.

Chronic Disease and Disability

Chronic disease, chronic impairments, and the disabilities of old age are indeed the major health problems of America's aging population. Even with the widest possible latitude in interpreting the laws authorizing Federal grants-in-aid for general health services, maternal and child health, and services for crippled children, we cannot expect existing, and possibly shrinking, appropriations for these purposes to carry a forthright attack on chronic disease and the health problems of the aging. Here we must depend upon the special programs which have been made possible by the demands of society for action against the first causes of death and invalidism.

There is strong popular support for chronic

disease control and for health services to the aging. Yet I would be less than candid if I did not say that State and local health services in most of these fields are scanty and scattered. Lacks of sufficient funds, facilities, personnel, and effective medical techniques are commonly cited as causes of the lag in health department activity. Another deterrent frequently mentioned is the resistance of physicians to any public health activity in these areas. I am sure that this occurs because of failure to explain properly the programs to them.

The measure of our statesmanship, then, need not be in convincing society that chronic diseases and impairments are health problems of the first magnitude. Society has already given its mandate—and gives it year after year—in support of our programs and of the voluntary agencies devoted to these special problems. Rather the measure of our statesmanship will be in convincing the medical and community leaders, in convincing boards of health, county councils and other governing bodies, that these health problems are social and economic problems of the first magnitude and worthy of their full support and action.

Once the interrelationships of chronic disability, old age, and economic dependency are clearly understood, there is every reason to believe that general cooperation in the development of community programs, in which all physicians cooperate, for prevention, as well as for care of the chronically ill, will be forthcoming. The development of health services, especially preventive and restorative programs, aims to reduce dependency and the costs of public assistance and public medical care. The possibility of sound economy sharpens the humanitarian impulse for cooperation and adequate support.

If health officials continue to represent their needs and the community's needs as encompassing no more than the limited public health programs of prewar days, they cannot expect the medical profession, the boards, councils, mayors, governors, and legislatures to recognize the changing health needs or to select the issues which require priority in the formulation of public policy. Public health statesmanship, in many respects, consists in raising our sights, in applying our technical competence to health problems wherever they exist and are being neg-

lected. This implies, of course, that public health will also be self-critical, reviewing and appraising its own performance so that activities which no longer yield substantial benefits to the community will be modified or reduced in favor of more effort in neglected fields. It means also that public health must work more closely with the practicing physician and his organizations.

Promotion of Research

Scientific research has not yet given us the techniques we shall ultimately need for pinpointing the attack on chronic diseases or for developing a practical hygiene of the aging. At present, control of many chronic diseases is possible in the individual patient, but only through highly specialized skills and equipment. At present, medical rehabilitation of the disabled is possible in the individual patient, but only through specialized skills and equipment.

For these reasons, public health conducts and encourages a continuing search for simplified techniques which may be applied to the community as a whole or may be employed by the general practitioner in his office. For example, in cancer control we are searching for detection mechanisms that can be applied widely and inexpensively in effective case-finding programs. We are searching for cancerigenic agents in the environment, so that these hazards may be subjected to engineering, chemical, or other controls. In cancer, heart disease, arthritis and rheumatism, and many other serious ailments, we are supporting the unremitting search for therapies that ultimately may be placed in the hands of the general practitioner. Our goal in these present major diseases is not dissimilar to that which we have achieved in venereal disease control—with every private practitioner a "health officer," treating patients in his office; the health department maintaining supporting services of case finding, contact tracing, referral, and treatment of patients unable to pay for private care.

Obviously, we have not reached that point in the development of medical tools for such major problems as cancer and heart disease, comparable with serologic testing and penicillin therapy

in syphilis control. The nation-wide scientific effort in these fields and its accomplishments are another story, and one that is inspiring.

Society has made new demands on science since the war and has given science unprecedented financial support. We are all aware of how little money was available for medical research before the war. In less than a decade, the American people have reversed that condition in their determination to speed up the attainment of their health goals through expanded research. The essential leadership in the promotion of medical research has come direct from the public through their voluntary health organizations and their representatives in Congress.

The American Pattern

The development of the nation-wide effort in medical research thus has followed a characteristically American pattern: society leading, government aiding. Government aid to medical research has grown, but statesmanship from the outset has channeled the greatest part of that growth into the natural habitats of research—our universities, schools of medicine, and hospitals.

Cooperation of voluntary and governmental agencies with the universities and hospitals in medical research is a multimembered partnership. It has engendered mutual respect and greater skills in the solution of common problems. Science and society alike have benefited from this partnership in a vital area of research.

While new techniques for chronic disease control and hygiene of the aging remain in a twilight zone between experiment and universal use, it may be that this experienced partnership can speed the sound application of scientific advances. It may be that we need a "bridge" type of institution, with research, educational, and limited service functions, supported by many community, State, and national organizations.

New Partnerships

Certainly, in facing up to the specific problems of chronic disease and an aging population, it seems clear that public health needs to encourage and to develop many new types of partnership. One that seems of exceptional

value is partnership with university schools of medicine. The foresight of Professor Winslow in keeping postgraduate education in public health at Yale an integral part of the School of Medicine has yielded rich returns. The department's cooperation with the city of New Haven further illustrates the value of this partnership between the university and the community's health services.

Recently the University of Buffalo School of Medicine released the first annual report of its Chronic Disease Research Institute. This project is an interesting experiment in new partnerships. The Public Health Service made available its Buffalo hospital which we were closing and which could be easily converted into the type of facility envisaged by the group of community health statesmen. The New York State Health Department provided a grant-in-aid, and entered into active cooperation with the university. Support for various departments of the institute came from the National Foundation for Infantile Paralysis, the New York State Association for Crippled Children, the New York State Department of Mental Hygiene, the Western New York Heart Association, and the Arthritis and Rheumatism Foundation. The governing board is chaired by the dean of the School of Medicine, and includes representatives from local hospitals, the New York State Department of Health, and the Public Health Service. An able staff has done outstanding trail blazing in its first full year of teamwork.

Let me quote from the report:

"The future plans of the institute are inherent in its purpose: to do research in the field of chronic disease, to discover better and faster means of returning the chronically ill to maximal living within their individual limitations and to teach these newer, better techniques for handling the most complex problems in rehabilitation to medical personnel throughout the Niagara Frontier. The University of Buffalo Chronic Disease Research Institute is a small but complete institution actively serving medical science and education within the community."

Would that there were more such small, complete institutions serving such a purpose within more communities where the problems of the

chronically ill have previously been neglected. Perhaps this modest beginning will give us valuable clues to public health statesmanship in this area. In the meantime, health departments must press on toward society's health goals through the organization of community resources.

Community Health Organization

The ideal of community health organization is nothing less than the mobilization of all the rich and varied forces within an American community in free and friendly association to combat a common enemy and to strive for the common heritage of health and longevity. Inspired by some of our educational institutions, notably the Yale Department of Public Health, the Nation's official and voluntary health agencies have learned a good deal about community organization in the past 15 or 20 years. To their credit, they have put into practice a good deal of this knowledge. The translation of the ideal into practice, however, is difficult as is any activity depending primarily upon interpersonal and intergroup relationships.

In community organization as in program planning and administration, public health officials need especially to be alert in preserving flexibility. If we recall our criteria for statesmanship, we will see why this is so: "Wise statesmen foresee what time is bringing and try to shape institutions and mold men's thoughts and purposes in accordance with the change that is silently coming."

Community organization merely to preserve the status quo of public health can be as stultifying and as far from meeting the needs as can the administration of programs designed for the same purpose. Moreover, community organization of this sort fails to tap fully the creative energies of the community. In particular, the natural leaders outside of professional ranks or in professions not usually associated with public health may possess the humane impulses and the very creativity needed for developing new types of service essential in the solution of our major public health problems.

I know of such a leader who wants to construct a new type of institution for the care of certain types of cancer patients. It will be a modern apartment hotel specially designed and

furnished, constructed beside and with direct connections to a general hospital. The objective here is to provide efficiency apartments where family members or housekeepers may care for the patient in convalescent or other stages of his disease. Physicians would be at hand for routine supervision. When special therapeutic procedures must be carried out, the patient can be removed to the hospital immediately, and without loss of time and the added costs of an ambulance. More costly institutional facilities and services would be released for the care of more acutely ill patients.

This is a challenging idea, and one which may capture the interest of private enterprise, voluntary agencies, and religious organizations. It is an extension of the home care plan which has been developed so effectively by voluntary hospitals and agencies in a few parts of the country. We know that chronic disease and poverty go hand in hand, and that many times the home to which a patient would be returned cannot accommodate the needs of an invalid, no matter how willing the family may be to carry its share of the bedside care. Whether in a hospital-connected apartment hotel or at home, the costs of convalescent or terminal care of the chronically ill will be less than in a hospital. Hospital care for a patient costs three to five times more than care at home.

New and Effective Services

There are many other effective services that a community could provide for the chronically ill and the aging—services which not only relieve suffering and anxiety, but also bring about economies in the operation of public hospital and medical services. Some health departments around the country report housekeeping services, for example; but it is surprising how few communities have explored the possibilities. The New Haven Family Society, as I understand it, was one of the pioneering voluntary agencies to develop such a service.

The District of Columbia Health Department has developed a housekeeping service on a limited scale. Its primary purpose is to assist mothers in the postpartum period or in disabling illness. When these demands on its staff permit, however, the housekeeping service is available to aged persons.

Not long ago, an indomitable lady in her 80's suffered her fourth cerebral hemorrhage. The hospital insurance policy which she had carried for a number of years had been invalidated by previous hospitalization. Even had it been available, she did not want to go to the hospital because, she said, there was no one to look after her "boys"—an older brother and a mentally defective nephew of about 25 years. Here was a family that had never received a penny of public assistance; that owned its home; that managed to get along on the earned pensions of the two old people. The house-keeping service came to the rescue. And at least for 10 critical days when this family most needed help, there was someone to cook nourishing meals, do the laundry, keep the spotless home spotless, help the lady with her personal care, and, incidentally, save taxpayers the costs of hospitalizing her.

I have introduced this "human interest" story, because it exemplifies in many ways the human problems which make up the community problems, the public health problems; and it exemplifies the variety of human resources which must be called upon to help people meet their needs.

World Health

The mobilization of resources to meet human needs is the essence of world statesmanship today. It is in this international arena that public health workers meet face to face the inseparability of their sphere of activity from that of other specialists. Professor Winslow has been a world health statesman since the years of the League of Nations Health Section. He has been telling us all this while that public health does not and cannot function apart from the political, economic, educational, and cultural forces in whatever society it serves. Likewise, industry, commerce, agriculture, education, and government cannot function in isolation from public health.

Several hundred American public health workers are facing these interdependent problems today in their overseas assignments with the Mutual Security Agency and the Technical Cooperation Administration of the United States, and with the World Health Organiza-

tion and other international agencies. Their statesmanship will be measured not alone by their skill in applying modern techniques to the solution of age-old problems in entirely different social and physical settings. Public health statesmanship in the world community also consists in understanding the drive of poverty stricken peoples toward a better life, and in ability to work with representatives of other governments and of such related fields as agriculture, education, industrial production, transportation, and communication.

Public health workers have invaluable knowledge and experience to contribute to the planning and conduct of programs for social and economic improvement in underdeveloped areas. Failure to take into consideration the health and medical aspects of any large-scale economic project may well lead to failure of the total plan. Here again, as in other situations I have mentioned, public health workers, as statesmen, must be alert to the health components in diverse social problems; must challenge disregard of health; and must exercise the arts of interpretation and communication in order that their technical skills may be used constructively.

Conclusion

In this somewhat random discussion, I have left untouched many specific problems in public health which call for statesmanship and many fields in which statesmanship of a high order is being exercised. I shall leave it to you to fill the gaps, for the qualities that make up statesmanship in the boundless field of public health are the same in each sector. Let the measure of our statesmanship now and in the years to come be taken by this yardstick:

"The objective of public health is not merely the prolongation of life but the increase of vigor, efficiency, and happiness of all the members of our complex society. . . It is no easy task that we have set ourselves, no task for those who fear opposition or criticism. Vested interests related either to economic profit or to prestige may stoutly bar the path to achievement. Even

when these are not involved, we are confronted by the stubborn resistances of humanity to those new ideas and new forms of organization against which the average individual desperately defends himself. We must be wise and understanding as well as courageous. The tasks of the future cannot be solved by formulæ alone; at point after point on the road there will be struggle in which wounds will be given and taken. Yet the objectives before us are so great that men of heart and courage will not hesitate to meet the risk. . . The road is long but the goal is worth the hazard. We need assume no unnecessary burdens nor needless quarrels. But when we are sure we are right, we must go ahead."

The time? 1936.

The place? The Milbank Memorial Fund Conference on Next Steps in Public Health (4).

The speaker? C.-E. A. Winslow—inspiration of this series of lectures—public health's great statesman.

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International Certificate Requires Official Stamp

Health officers who do not have an official stamp to certify international vaccination certificates are requested to have a stamp made which includes the term "health officer" and the name and address of the health department. This stamp is required to attest to the signature of the immunizing physician, or physicians, affixed on the smallpox and cholera vaccination certificates entered in the new "International Certificates of Vaccination" form soon to be released. This document conforms with the International Sanitary Regulations effective October 1, 1952, and replaces the "International Certificate of Inoculation and Vaccination," PHS-731 (FQ), Rev. 12-48. No certificate is valid without the stamp of a "health officer." Public Health Service officers and medical officers of the Department of Defense will continue to use the seal of their respective service to authenticate these certificates.

Yellow fever vaccination certificates will be issued to the traveler at the time he receives his vaccination at one of the designated yellow fever vaccination centers. This certificate must carry the stamp of the designated clinic.

The Prevention of Rheumatic Fever

RHEUMATIC FEVER is a recurrent disease which can be prevented. It is now generally agreed that both the initial and recurrent attacks of the disease are usually precipitated by infections with beta hemolytic streptococci. Therefore, the prevention of rheumatic fever and rheumatic heart disease depends upon the control of streptococcal illnesses. This may be successfully accomplished by early and adequate treatment of streptococcal infections in all individuals and by prevention of streptococcal infections in rheumatic subjects.

Treatment of Streptococcal Infections

In the general population at least 3 percent of untreated streptococcal infections are followed by rheumatic fever. Among certain individuals, especially those with previous rheumatic fever, the incidence is much higher. Adequate and early penicillin treatment, however, will prevent most attacks of rheumatic fever and eliminate streptococci from the throat.

Diagnosis

In most instances it is possible to recognize streptococcal infections by their clinical manifestations but laboratory tests may assist in establishing the diagnosis.

Epidemiology

The seasonal pattern and presence of similar cases in the community or household may be helpful. For example, streptococcal infections

in the northern United States are most common from January through June. Likewise, a case of scarlet fever in one child would suggest that a sore throat in another has the same etiology.

Symptoms

Sore throat—onset sudden, in the tonsillar area, not in the trachea.

Headache—common.

Fever—variable, but generally from 101° to 104° F.

Abdominal pain—common, especially in children. Not too common in adults, but does occur.

Nausea and vomiting—common, especially in children.

These symptoms are usually *not* present: (1) simple coryza; (2) cough; (3) hoarseness.

Signs

Red throat—frequently beefy red, but if seen early the redness may be mild.

Exudate—usually present.

Glands—swollen, tender tonsillar glands at angle of jaw.

Rash—scarlatiniform (characteristic of scarlet fever, not common).

Discharge—otitis media and sinusitis indicated by (serous or purulent) aural or nasal

This statement was released for publication this month by the Council on Rheumatic Fever and Congenital Heart Disease of the American Heart Association. It was prepared by the council's committee on prevention of rheumatic fever of which Burtis B. Breese, M.D., is chairman and the following are members: Marjorie T. Bellows, Edward E. Fischel, M.D., Ann Kuttner, M.D., Benedict F. Massell, M.D., Charles H. Rammelkamp, Jr., M.D., and Edward R. Schlesinger, M.D.

discharge are frequent complications of streptococcal pharyngitis.

Laboratory

White blood count—generally over 12,000 and in children frequently over 20,000.

Throat culture—positive for hemolytic streptococci.

Therapeutic Response

Almost without exception patients with streptococcal infections are vastly improved within 24 hours after penicillin has been started and the temperature normal, or nearly so. This therapeutic response is characteristic and if it does not occur, the chances are much against the disease being due to hemolytic streptococci.

Treatment

In order to be effective, treatment should be started immediately when a streptococcal infection is suspected and continued for sufficient time to eradicate the streptococci from the throat.

Penicillin is the drug of choice for treating streptococcal infections.

Both the oral and the intramuscular routes of administration have been utilized successfully for penicillin therapy of streptococcal infections. Intramuscular injections have been proved to prevent rheumatic fever. The data on the value of oral penicillin as a preventive are less complete.

Oral administration in comparison to intramuscular administration has these advantages:

1. It is not as distasteful to many patients.
2. It requires fewer physician visits.

It has these disadvantages:

1. Larger amounts of penicillin must be used.
2. It is difficult to administer to vomiting or refractory children.
3. In some adults it gives rise to persistent diarrhea and pruritus ani.
4. It is difficult to be sure that treatment is continued for sufficient time and given in proper relation to meals to be effective.

RECOMMENDED SCHEDULES

Intramuscular Penicillin

Children—one intramuscular injection of 300,000 units of procaine penicillin with aluminum monostearate in oil *every third day for three doses*.

Adults—one intramuscular injection of 600,000 units procaine penicillin in aluminum monostearate *every third day for three doses*.

NOTE: Less preferable, but usually effective—two doses as above at 3-day intervals.

Oral Penicillin

First 5 days: 200,000 to 300,000 units $\frac{1}{2}$ to 1 hour before meals and at bedtime (total of 800,000 to 1.2 million units per day in four divided doses. Lesser amounts for children; larger amounts for adults).

Second 5 days: 200,000 to 250,000 units $\frac{1}{2}$ to 1 hour before meals (total 600,000 to 750,000 units per day in three divided doses).

NOTE: To be effective, therapy should be continued for the entire 10 days even though the temperature may return to normal and the patient may feel better within 1 or 2 days.

Combination of Intramuscular and Oral Penicillin

Therapy may begin with one injection of penicillin (300,000 units procaine penicillin with aluminum monostearate in oil) and then, beginning 3 days after the injection, continued for an additional 7 days with oral penicillin according to the schedule outlined above for the second 5 days.

Other Medication

Aureomycin: Less effective than penicillin in controlling streptococcal infection but it is especially useful in those sensitive to penicillin. Dosage: Total 10 mg. per pound of body weight in four divided doses daily for 2 days. Cut dose in half for remaining 8 days of therapy.

New preparations of penicillin: These may be effective and even preferable to the treatment schedules outlined, but at present they have not had sufficient trial to warrant their recommendation.

A Community Program for the Prevention Of Rheumatic Fever Recurrence

By MARY ALICE SMITH, M.D.

A PUBLIC HEALTH program to demonstrate techniques of community action in heart disease control began operation in Newton, Mass., in 1948. It was sponsored jointly by the Public Health Service of the Federal Security Agency, the Massachusetts Department of Public Health, and the Newton Health Department. The local medical profession was active in support of the project, and continuing leadership was given by a cardiac program committee composed of six physicians from the staff of the Newton-Wellesley Hospital. The progress of the Newton Heart Demonstration Program, as it was named, has been reported periodically (1-4). This paper is an interim accounting of rheumatic fever activities in the Newton demonstration.

Five general areas of activity were delineated at the beginning of the demonstration program in 1948: physician education, voluntary morbidity reporting, community organization, nutrition services, and rehabilitation. Subcommittees were organized for each of these areas. As experience was gained and the extent of the problem seen more clearly, some plans were modified. Morbidity reporting was abandoned, community organization was turned over to the Newton Community Council, and interest was directed to two or three new fields. One of

these, and a major heart disease problem in Newton, was rheumatic fever.

In 1949, the most recent year for which data are available, rheumatic fever and its sequelae were the leading causes of death from disease in the 10- to 14-year-old age group; in the group between 15 and 24 it was third, being exceeded only by tuberculosis and malignant neoplasms. The amount of chronic disability caused by rheumatic fever is also considerable. Recurrent attacks of rheumatic fever are common, particularly during the first few years following original onset, and each attack damages the heart more severely.

Rheumatic fever attacks are nearly always preceded by hemolytic streptococcal infections. The rheumatic child possesses a peculiar vulnerability and tissue reactivity to certain streptococcal infections (5). Most workers in the field now agree that the beta hemolytic streptococcus, Lancefield type A, precipitates the acute attack of rheumatic fever, even though the mechanism is as yet not fully understood (6). Children in families in which both parents have had rheumatic fever are much more likely to develop the disease than are children of parents with no such history. Due to the influences of the genetic factor and close association, siblings of rheumatic children are especially susceptible (5).

Early treatment of streptococcal infections with penicillin prevents rheumatic fever. In an Air Force study of some 2,300 persons, immediate and thorough treatment of streptococcal infections with penicillin effected a 91-percent reduction in the attack rate of rheumatic fever (7). The daily use of penicillin also has been

Dr. Smith, formerly medical officer-in-charge of the Newton (Mass.) Heart Demonstration Program, Division of Chronic Disease and Tuberculosis, Public Health Service, is now resident physician at Mount Auburn Hospital, Cambridge, Mass.

advocated to protect rheumatic fever patients against recurrent attacks. Other members of their families, too, should be treated when they have streptococcal sore throats. Massell and his colleagues at the House of the Good Samaritan in Boston developed drug schedules in 1948 for the protection of rheumatic fever patients against recurrences (8).

The Newton Program

On the basis of these and other clinical trials, the control of rheumatic fever in Newton seemed possible through application of existing knowledge even though it was incomplete. Previous reports have described in greater detail the following major steps in the development of the rheumatic fever control program in Newton, a Boston suburb with a population of 85,000:

1. At a meeting held in December 1949, the cardiac program committee authorized a telephone survey of physicians to determine the extent of preventive measures then being taken. From this survey, it was learned that virtually no efforts were being made to prevent recurrence of rheumatic fever.

2. As a result of these findings, a rheumatic fever subcommittee was set up to continue the program.

3. Massell's oral penicillin prophylactic schedules (4) were obtained by the subcommittee and introduced at one of the regular teaching sessions sponsored by the subcommittee on physician education.

4. A plan was adopted for penicillin to be dispensed by the health department upon the physician's prescription, at low cost, or free to those unable to pay.

5. So that physicians might acquaint rheumatic fever patients with the preventive care desirable for them, it was planned that the director of public health would write to rheumatic patients listed in his handicapped children's file, requesting them to visit their physicians for advice about prophylaxis.

6. In order to find families with children having a history of rheumatic fever, the cooperation of the public and parochial schools was obtained. A survey form distributed to 14,000 children requested their parents to indicate any

knowledge of rheumatic fever in the family and, for verification of diagnosis, to include the name of the family doctor.

7. It was also decided that a study of the prophylaxis program should be made to evaluate the effectiveness of efforts to place persons susceptible to rheumatic fever under their doctor's care, as well as the effectiveness of the penicillin dosage schedule itself in preventing recurrences of rheumatic fever.

During February and March 1950, these plans were put into effect: The availability of low-cost penicillin was announced; letters were sent to the parents of school children in an attempt to procure additional rheumatic fever histories; and families known to include rheumatic fever patients received letters asking them to visit their physicians for appropriate instruction. As new rheumatic fever families were found, they, too, were directed to their doctors for prophylactic care. During the early months of the program, also, personal visits were made to physicians known to have rheumatic fever patients in their practice. To determine the approximate prevalence of streptococcal infection in the community, free throat cultures of patients with suspected streptococcal infections were made by the Newton-Wellesley Hospital (9).

In the fall of 1950, another announcement was made concerning the availability of low-cost penicillin and use of the prophylactic schedules. As a diagnostic aid, the local physicians then received a copy of a definitive article by Dr. T. Duckett Jones, outlining criteria for the diagnosis of rheumatic fever (10).

The Study Group

In December 1949, just before the program was instituted, only 16 percent of the known rheumatic fever patients were receiving any kind of protection against recurrence of their rheumatic fever. After record searching, physician interviews and analysis of the family history questionnaires, it was believed that, as of January 18, 1952, all patients in need of prophylactic care were known to the health department. On that date there were 74 such patients in the community of whom 55 were known to have had their initial attack since the

A Community Program for the Prevention Of Rheumatic Fever Recurrence

By MARY ALICE SMITH, M.D.

A PUBLIC HEALTH program to demonstrate techniques of community action in heart disease control began operation in Newton, Mass., in 1948. It was sponsored jointly by the Public Health Service of the Federal Security Agency, the Massachusetts Department of Public Health, and the Newton Health Department. The local medical profession was active in support of the project, and continuing leadership was given by a cardiac program committee composed of six physicians from the staff of the Newton-Wellesley Hospital. The progress of the Newton Heart Demonstration Program, as it was named, has been reported periodically (1-4). This paper is an interim accounting of rheumatic fever activities in the Newton demonstration.

Five general areas of activity were delineated at the beginning of the demonstration program in 1948: physician education, voluntary morbidity reporting, community organization, nutrition services, and rehabilitation. Subcommittees were organized for each of these areas. As experience was gained and the extent of the problem seen more clearly, some plans were modified. Morbidity reporting was abandoned, community organization was turned over to the Newton Community Council, and interest was directed to two or three new fields. One of

these, and a major heart disease problem in Newton, was rheumatic fever.

In 1949, the most recent year for which data are available, rheumatic fever and its sequelae were the leading causes of death from disease in the 10- to 14-year-old age group; in the group between 15 and 24 it was third, being exceeded only by tuberculosis and malignant neoplasms. The amount of chronic disability caused by rheumatic fever is also considerable. Recurrent attacks of rheumatic fever are common, particularly during the first few years following original onset, and each attack damages the heart more severely.

Rheumatic fever attacks are nearly always preceded by hemolytic streptococcal infections. The rheumatic child possesses a peculiar vulnerability and tissue reactivity to certain streptococcal infections (5). Most workers in the field now agree that the beta hemolytic streptococcus, Lancefield type A, precipitates the acute attack of rheumatic fever, even though the mechanism is as yet not fully understood (6). Children in families in which both parents have had rheumatic fever are much more likely to develop the disease than are children of parents with no such history. Due to the influences of the genetic factor and close association, siblings of rheumatic children are especially susceptible (5).

Early treatment of streptococcal infections with penicillin prevents rheumatic fever. In an Air Force study of some 2,300 persons, immediate and thorough treatment of streptococcal infections with penicillin effected a 91-percent reduction in the attack rate of rheumatic fever (7). The daily use of penicillin also has been

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of 1950, coincident with the major education effort. The remaining 11 were added to the series at a rate of about 1 each month thereafter.

Interviews with the physicians brought out the fact that, in more than half the instances where patients were replenishing supplies only irregularly, the physicians had been unaware of the irregularities until these were brought to their attention. The same physicians were asked for their reaction to the suggestion that the health department should send out reminder cards to patients when their supply should have been consumed. Only about half the opinions favored this measure, and the suggestion was not pursued.

Some physicians were able to keep all their patients in the "regular" penicillin category throughout the period of this study. Others were unsuccessful in teaching all of their patients the advantages of the regular use of penicillin.

Three physicians had patients in all three of the treatment categories—prophylactic penicillin, sulfonamides, immediate treatment for streptococcal infections.

Of the 28 patients in the "regular" penicillin group, their physicians reported that only one had had a streptococcal infection while receiving penicillin—a patient with scarlet fever in whom repeated throat cultures revealed no beta hemolytic streptococci. At least 11 other non-streptococcal infections, however, did occur within this same group. No penicillin reactions were reported by physicians.

There were no recurrences of rheumatic fever among the 74 patients through January 18, 1952.

The program will be continued by a routine procedure in which, on finding children with rheumatic fever (as, for example, through a school physical examination), the health de-

partment will send the child's physician an announcement of the availability of penicillin and a request that he return a card noting prophylactic measures being taken and permissible physical education activities at school.

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Employment of the Older Worker

By THEODORE G. KLUMPP, M.D.

THE PRACTICE of compulsory retirement on pension at a fixed chronological age is a fairly new practice. Its adoption started with the incredibly swift industrialization of the 1900's and the growth of large business units.

The acceptance of pension retirement plans by industry was hailed on all sides as a great advance. Previously, older workers had simply been discharged without provision for their future welfare. The conventional idea had prevailed that workers should save for their old age or become dependent on adult offspring or on charity. Industry's voluntary acknowledgment of a concern for the welfare of its workers beyond their years of service was indeed a step forward.

Now, industry has accustomed itself to the practice of compulsory pensioned retirement at a fixed calendar age. The practice is simple in administration, and, during slack periods especially, it provides an easy, automatic way of casting off a number of surplus workers who are generally on top of the pay scale. In addition, compulsory retirement opens doors for advancement, a custom which business will not easily yield.

Human Side of Compulsory Retirement

There is growing recognition, however, that the mere provision of bread and shelter for older persons is not enough. No longer are they regarded as a statistical group—a series of figures on a sheet of paper—but they are regarded as individuals whose happiness is of increasing concern.

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"Employment, . . . 'nature's physician,' is so essential to human happiness that indolence is justly considered the mother of misery," wrote Robert Burton over three centuries ago (1).

Youth can be content with opiate dreams of future achievements. But those approaching 50 or 60 can no longer derive solace from dreams of the future. Age plays for real stakes. It wants something to do, and that something must be real. Useful work is the most real thing we have to sustain us in this life of ours.

Compulsory retirement at a fixed calendar age treats all workers alike. But all workers are not alike. Some have the intellectual resources to occupy themselves without an occupation. Most people, however, are not happy when they are idle. In the words of the physiologist, Dr. A. J. Carlson, "The physiologic age of the worker is not synonymous with his chronologic age, owing to the individual variables in heredity, mode of living, accidents, and sequelae of diseases" (2).

What is popularly called old age is in truth only that period of life during which the rate of decline of cells, tissues, or organs has progressed to the point where the decline is visible to the naked eye. The decline begins at conception, and it is not the same for all human beings nor is it equivalent for all organs and functions of the body. This is well illustrated by the life of Christen Jacobsen Dragenberg, the Dane who died in 1772 at the age of 146. At 13, he went to sea. He took part in the service of three kings warring against Sweden and served many nations in merchant navies. When nearly 70, he was taken prisoner by Algerian pirates and sold as a slave. After 15 years, he escaped and again went to war against Sweden. At 111, he married a 60-year-old woman.

He outlived her and, when he was 130, proposed to several women. He was rejected but mastered his disappointment and lived on for 16 years (3).

Our society has been quite illogical and inconsistent in its attitude toward the older worker.

On the one hand, we have not objected to electing or appointing older persons to positions of greatest responsibility. In the 81st Congress (1st and 2d Sessions, 1949-50), 34 percent of the Senators were over 60, as were almost 19 percent of the Representatives. In a study made in 1946 I found that over 44 percent of 500 top business executives who were listed consecutively in the 1946 edition of "Poor's Register" were over 60. Bernard Baruch, 82 years of age; Arturo Toscanini, 85; Herbert Hoover, 78; General George Marshall, 71; and Ambassador Walter Gifford, 67, have not found their age an obstacle in the path of progress.

On the other hand, we maintain blind and unselective compulsory retirement rules for the rank and file of workers. Such rules automatically eliminate those who have reached the same age regardless of their fitness, ability, and contribution to the group.

Economic Side of Compulsory Retirement

From an economic point of view, it would be sound policy to permit older people to work as long as they are productive and desire to work. Since a country's national wealth, purchasing power, and standard of living rest squarely on productivity, our economic stream flows best when we have the largest number of active producer-consumers. The unemployed contribute nothing to the economy.

In about 30 years, the United States will have more individuals over 45 years of age than the 61 million (4) gainfully employed today. It is conservatively estimated that by 1980 there will be between 160 and 180 million people; 66 million of them will be 45 and over; 24 million will be 65 and over.

If in 1980, for example, we were to employ only one-fifth of the estimated 24 million people over 65, at an average annual salary of \$2,500, they would earn for themselves 12 billion dollars each year. This load of support would be

taken largely off the shoulders of young workers. The more emeritus workers, the greater the burdens will be on those active workers who must support them, either by direct contribution or by taxes, along with their own families.

The argument has been made that older workers should be cleared out to make way for younger ones. This is only another way of saying that there are more workers than jobs. During World War II, no one was afraid that the old or the physically handicapped were taking jobs from younger, more able people. There is no arbitrary age at which the older worker begins to repress the younger. Every older individual high on the ladder of advancement holds a job a younger person feels he can fill. This will be just as true in 1980, when we may be forced to retire people at 45 or 50, if we have failed to find a more logical way of reducing the disparity between jobs and workers.

From another point of view—we are witnessing today a great ground swell of public sentiment in favor of State or Federal old age pensions for those over 65. The figure of \$100 a month is one prominently mentioned objective. By 1980, this could cost the country \$28,800,000,000. When this sum is added to other welfare benefits which have been adopted, or probably will be, we are confronted with an astronomical figure which some statesmen declare we cannot afford.

Why Selective Retirement?

In view of these facts, it is increasingly clear we must overcome the prejudices of present-day employers against hiring older workers and retention of the fit. The fixed formula of retirement must be made more flexible and must be broken down into alternative possibilities:

Continued work for the fully productive.

Job reassignments for those capable of performing other duties.

Down-grading and "tapering off" when necessary or desirable.

A whole new system of fitness testing, job analysis, and selective placement awaits development.

To encourage the cooperation of industry, some economists have suggested a pension tax rebate so that employers will keep workers be-

yond the compulsory retirement age. Henry W. Steinhaus, in a study for the National Industrial Conference Board, considers that an employers' tax incentive is feasible, and, in addition, he proposes an increase in pension benefits for employees for each year their retirement is deferred beyond age 65 (5).

We choose and we select when we hire. Can't we do the same when we retire our workers?

We should devise methods of determining which people are capable at 65 or 70 and which people are not. A man isn't fit one day and unfit the next because a page of the calendar has turned. By the same token, he isn't conservative one day and liberal the next, or cautious one day and reckless the next.

The Armed Forces have successfully handled the problem of selective retirement by retirement board procedures which determine the physical and mental fitness of servicemen and officers in the light of the current needs of the services. Perhaps industry could find in these procedures a sound basic pattern which can be adapted to its own purpose. An infinitesimally small number of industrial organizations have practiced selective retirement with success.

In any circumstances, a social rule which eliminates the fit with the unfit, which destroys the good with the bad, or which punishes the innocent with the wicked is not a good rule. Social progress may be measured, in the last analysis, by the degree of skill and discrimination with which society solves the individual problems of its members.

Bernard Baruch is quoted in the *Washington Daily News* of December 29, 1949, as saying:

"How hideous a mockery it would be if, as a result of advances in medicine, surgery, hygiene, and higher living standards, older people were left willing and able to work but Society deprived them of something to do."

Fortunately, the idea that compulsory retirement on a calendar age basis is wrong is gaining general acceptance. The National Health Assembly on May 4, 1948, unanimously adopted a recommendation to this effect (6).

In his 1948 report to the President on the Nation's health, the Federal Security Administrator states:

"Efforts should be directed toward accomplishing selective retirement based on individual capacity rather than age . . . Both public and private employers would profit equally with employees from working out techniques for gradually relieving individuals of more taxing responsibilities as they develop the limitations of advancing age, by keeping pay commensurate with productivity and by full use of the possibilities of vocational retraining" (7).

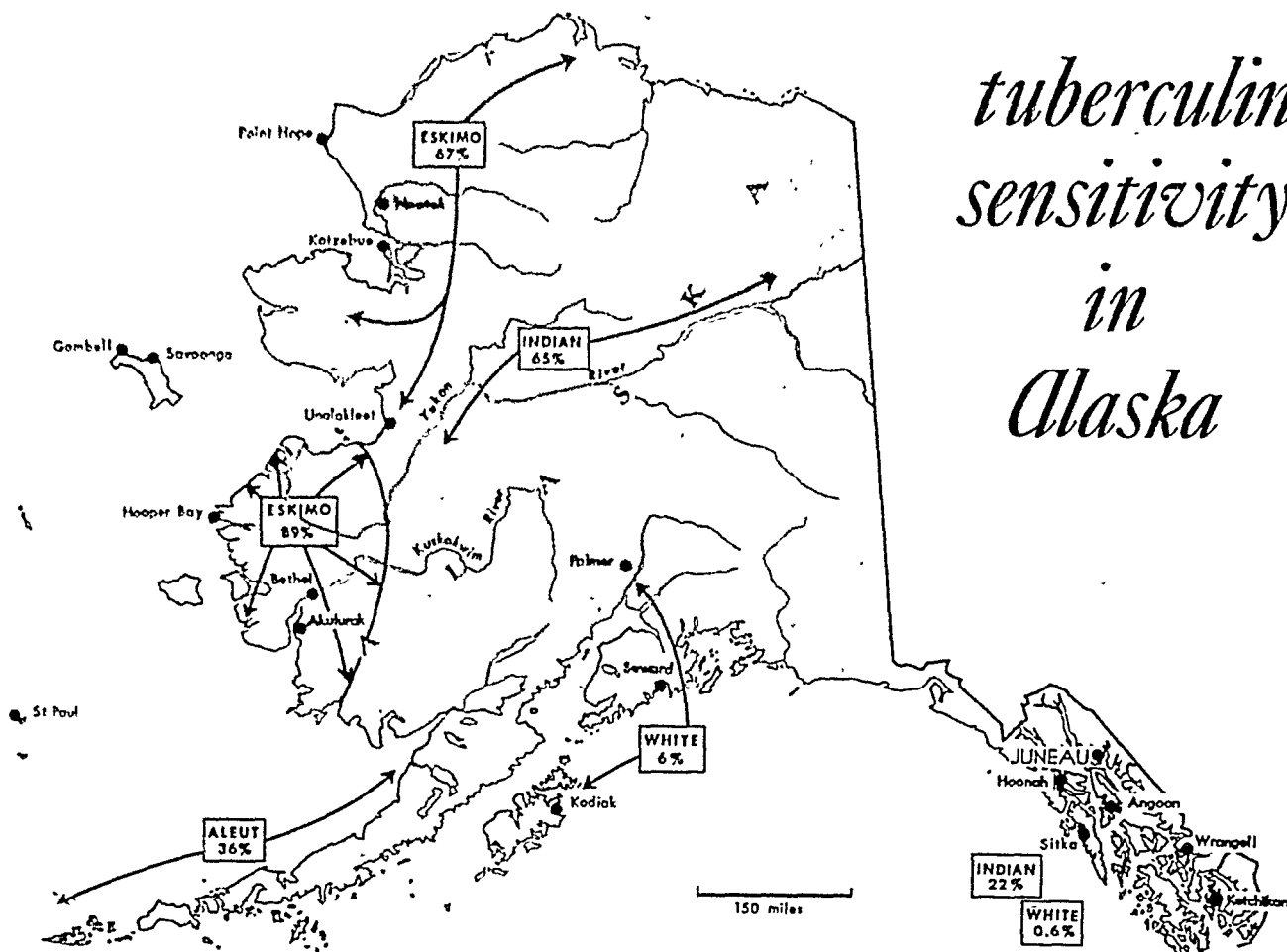
But ideas are sterile unless we act on them.

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tuberculin sensitivity in Alaska



Towns and villages shown are those where 100 or more tests are counted.
Percentages are reactor rates among 5- and 8-year-old children.

By EDWARD S. WEISS, M.P.H.

ALTHOUGH it is generally recognized that tuberculosis constitutes one of the most serious health problems in Alaska, few specific data are available for measuring its extent. The commissioner of health for Alaska has quoted a 1950 tuberculosis death rate among the Eskimos, Indians, and Aleuts of 600 per 100,000 population and a prevalence of active tuberculosis of 25 percent in some villages (1). In comparison, the estimated tuberculosis death

rate in the continental United States in 1950 was about 23 per 100,000 population (2).

Prerequisite to a reasonable interpretation of these figures for Alaska, however, is some knowledge of the number and distribution of the people. The 1950 civilian population, based on Bureau of the Census figures (3) was about 108,000: Eskimos, Indians, and Aleuts numbered 34,000; other civilians, mostly whites, 74,000. The white population is concentrated in a few comparatively large cities, but the Eskimo, Indian, and Aleut population is scattered throughout the Territory in many small villages (figs. 1 and 2). Evaluation of the magnitude of the tuberculosis problem

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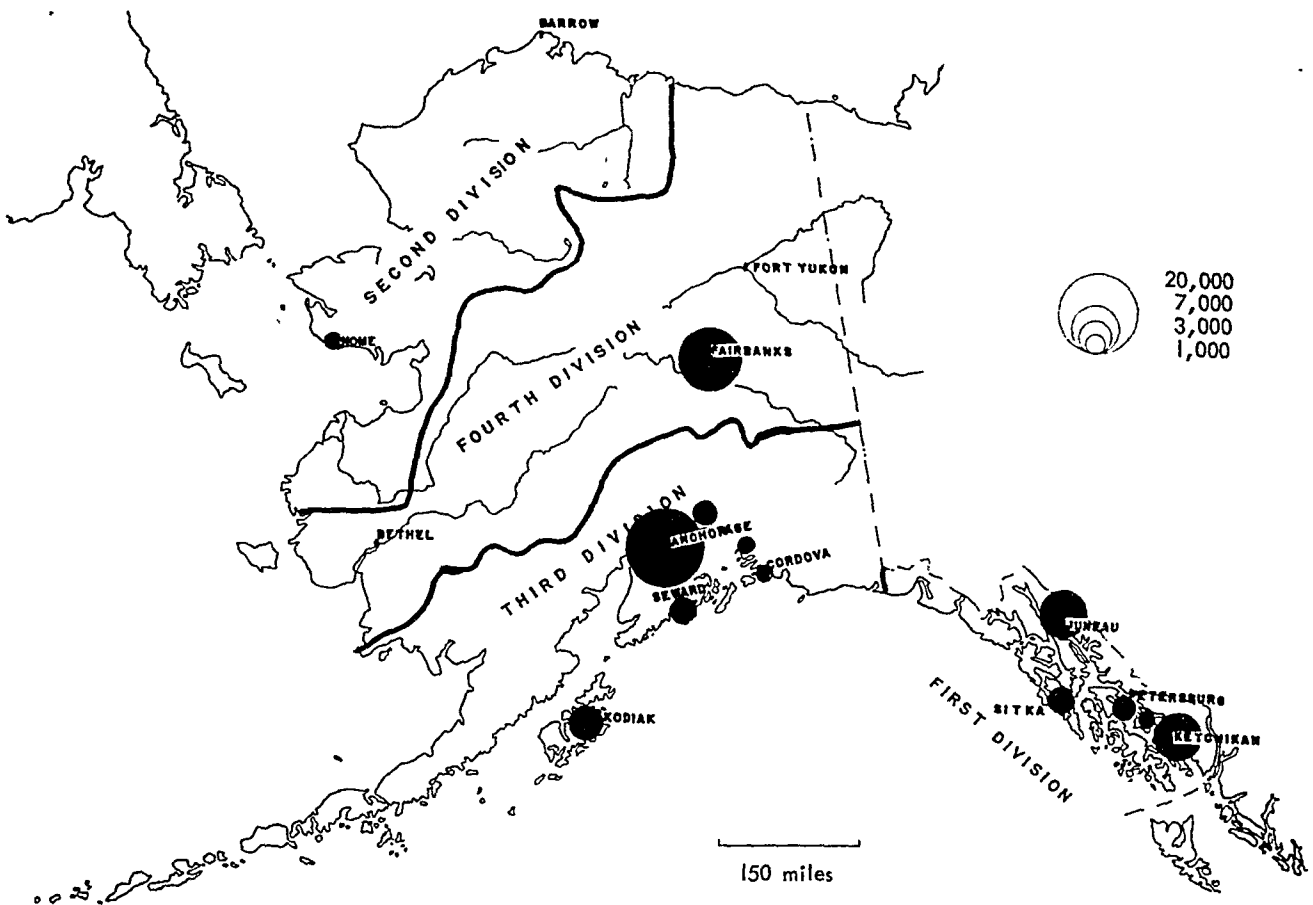


Figure 1. Estimated distribution of the white population of Alaska, 1950.

therefore presents difficulties not usually encountered in public health practice in the States.

The 90-percent increase in the white civilian population of Alaska between 1939 and 1950 was largely due to the entry of employable adults and their children into the Anchorage and Fairbanks areas. Since many of these newer residents, as well as some of the older ones, return to the States for medical care, especially when extended hospitalization is involved, tuberculosis mortality statistics are of little value with respect to this group.

Rejecting mortality statistics as an index of prevalence leaves two practical measures: mass X-ray survey results and tuberculin sensitivity data. Although records of both are available, the latter provide greater coverage numerically and geographically. They are a byproduct of an extensive BCG program of the Alaska Department of Health. Since age-specific tuberculin sensitivity rates are among the most useful measures of the prevalence of infection, the results of tuberculin tests have been tabulated

and analyzed for specific racial groups in designated geographical areas in order to achieve a preliminary definition of the tuberculosis problem.

Materials and Methods

In September 1948, the Alaska Department of Health began its BCG program. By the spring of 1951, when the program was interrupted for administrative reasons, about 30,000 tuberculin tests had been performed on civilian persons of all ages throughout the Territory.

In general, groups which were predominantly Eskimo, Indian, or Aleut were tested with a dose of 0.00002 mg. (1 tuberculin unit) of PPD-S; those which were predominantly white, with 0.0002 mg. (10 tuberculin units) of the same product. However, the Aleuts whose records were selected for this study received a dose of 0.0002 mg. of the tuberculin.

Results of the tests were recorded only as negative or positive. The reaction was classi-

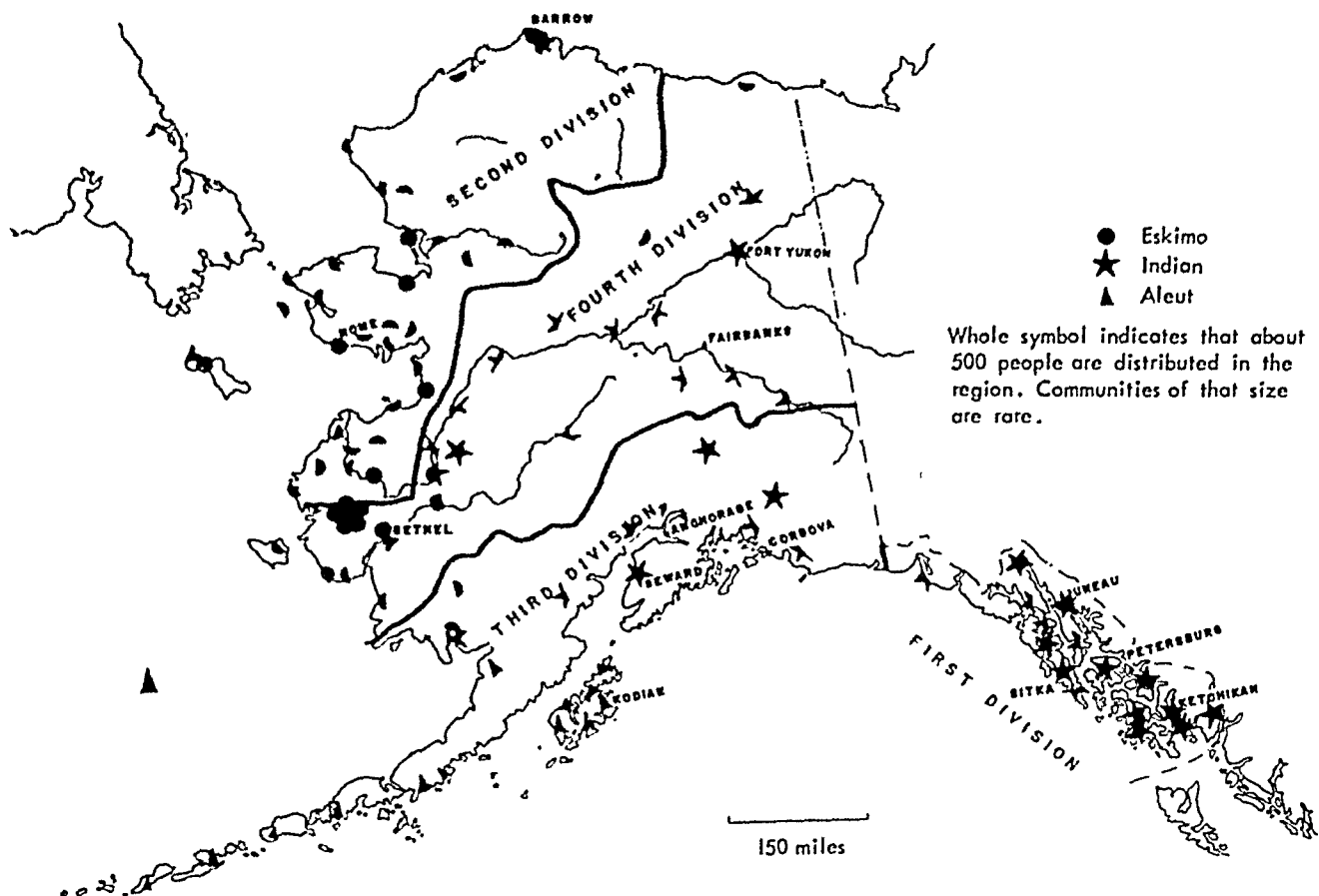


Figure 2. Estimated distribution of Eskimo, Indian, and Aleut population of Alaska, 1950.

fied positive if the area of induration measured 8 mm. or more in diameter 48 hours after injection of the tuberculin.

The records of 6,504 children through age 14 years who were tested on the first visit of the BCG team to their respective communities were selected for tabulation and analysis. The age limit of 14 years was set when preliminary examination of the data disclosed that almost all native adults and older children were reactors. Over half of the original group of records was eliminated on this basis. The availability of two sets of data based on different tuberculin doses and the existence of less than 20 records for small isolated communities were other reasons for eliminating records.

Although combination of tests with different doses was avoided, no further distinction was made between the results of tests with the 0.0002 mg. and the 0.00002 mg. doses. Furcolow and his colleagues (4) showed that although there was a marked increase in the number of reactors among tuberculous children as the PPD dose

was increased from 0.000001 mg. (0.05 tuberculin unit) to 0.00001 mg. (0.5 tuberculin unit), the latter dose brought the S-shaped dose-response curve so near its upper asymptote that the next increase to 0.0001 mg. (5 tuberculin units) elicited few additional reactors. They further showed that the greatest increments in reactors among apparently nontuberculous children were in the tenfold steps above 0.0001 mg.

The difference in the two doses used in the Alaskan program, therefore, cannot account for more than a negligible portion of the differences in sensitivity rates.

Results

The age-specific tuberculin sensitivity rates for each of seven groups, homogeneous with respect to race, area, dose, and pattern of response, and the observations from which they were computed are presented in the table.

A number of alternative ways of summarizing these data for comparative purposes are

Tuberculin sensitivity, by age, race, and area, Alaska, 1948-51

Age (in years)	Eskimo		Indian		Aleut	White	
	Yukon and Kuskokwim Deltas	Northwest coast and Seward Peninsula	Interior	Southeast (panhandle)	Aleutian Islands to Kodiak	South central	Southeast (panhandle)
Percent positive							
Under 1.....	12.8	4.1	19.0	4.9	2.5	0	0
1 to 2.....	41.8	19.1	25.0	9.6	11.1	.8	0
3 to 4.....	76.6	40.6	30.2	13.7	25.0	0	.8
5 to 6.....	86.9	62.0	52.0	23.4	25.4	4.5	.6
7 to 8.....	91.0	72.6	79.2	21.4	45.1	7.0	.5
9 to 10.....	88.9	80.1	81.8	49.6	52.6	8.2	2.0
11 to 12.....	95.5	83.0	81.2	46.0	60.0	6.1	6.4
13 to 14.....	94.7	88.1	92.9	52.1	83.9	13.9	10.5
Number tested							
All ages.....	1,262	1,500	201	702	582	1,274	983
Under 1.....	109	147	21	41	40	80	26
1 to 2.....	196	237	36	83	81	132	84
3 to 4.....	184	229	43	80	84	165	132
5 to 6.....	183	216	25	111	71	178	169
7 to 8.....	177	164	24	112	91	214	194
9 to 10.....	152	176	22	117	78	184	148
11 to 12.....	110	171	16	87	75	163	125
13 to 14.....	151	160	14	71	62	158	105

available. For example, the annual infection rate required to establish the observed levels of sensitivity or the age at which 50 percent of the children had attained sensitivity to the antigen might be used. In preference to these more elegant parameters, a simple expression of the proportion of reactors in the middle age groups, 5 through 8 years old, was selected.

The proportions of reactors among children 5 to 8 years old in each of the seven groups, designated by race and area, are shown on the map on the title page. They range from an almost unbelievable high of 89 percent for Eskimos in the region of the Yukon and Kuskokwim Deltas to 0.6 percent for white children in the southeastern panhandle.

The Eskimo children of the northwest apparently are less exposed to infection than their southern kinsmen, for the sensitivity rate there is 67 percent, about the same as that found among the Indians of the interior (65 percent). Southeastern Indians appear to be in a compar-

atively favorable condition, with 22 percent of their 5- to 8-year-old children reacting to tuberculin.

The comparable rate among Aleuts is 36 percent, very high in comparison to the 6 percent and 0.6 percent observed among white children in the two designated areas but much lower than that for either group of Eskimos or the Indians of the interior.

Discussion

The variations in sensitivity among the seven specified Alaskan groups almost cover the range recorded for the rest of the world. No available report, not even that based on tests of "Chinese children of the poorest classes" (5), shows levels of sensitivity exceeding those observed among the delta Eskimos. On the other hand, few communities in the United States show levels lower than those recorded for the white children of the panhandle. Myers, for example,

states that there are now many schools in Minnesota in which no child reacts to tuberculin (6). That goal is within the grasp of one group of Alaskans, but at present completely out of the reach of many others.

The success of any control program attempting to deal with tuberculosis in Alaska or even with tuberculosis among the Eskimo, Indian, and Aleut population in Alaska will require an appropriate "area control" viewpoint. Different plans, procedures, and objectives may have to be used for various areas.

Summary and Conclusion

1. The records of tuberculin tests on 2,762 Eskimos, 903 Indians, 582 Aleuts, and 2,257 white children through age 14 years were selected from records of the Alaska BCG program.

2. The records were tabulated to show the age-specific sensitivity rates prevailing in selected population groups.

3. The rates observed for Eskimo, Indian, and Aleut children 5 to 8 years old ranged from 89 percent among a large group of Eskimos to 22 percent among Indians of the southeastern panhandle. The rate for another group of Eskimos and the Indians of the interior was approximately 65 percent.

4. Sensitivity rates of 0.6 and 6.0 (similar to those observed in cities of the United States)

were found among white children aged 5 to 8 years old.

Although conventional control measures are probably adequate for maintaining or reducing the low prevalence of tuberculosis among the white residents of the Territory and the Indians of the southeastern area, it is unlikely that they can succeed among the other groups in Alaska.

* * *

A list of the villages selected for this report, number and date of tests in each, and the dosage of tuberculin used may be obtained from the author.

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Indexes for 1952

The index to *Public Health Reports* for 1952 (vol. 67) will be published as a separate and distributed to all subscribers with an early issue. In addition to author and subject entries for all material which appeared in the monthly issues, the index will contain data for Public Health Monographs as well as a cumulative listing of monograph titles published through December 1952.

Complement Fixation Tests For Murine Typhus On Small Mammals

By RUTH KEATON, B.S.

BILLIE JO NASH, B.A.

J. N. MURPHY, JR., M.A., M.S.P.H.

J. V. IRONS, Sc.D.

THE IMPORTANCE of commensal rats and their fleas in the epidemiology of endemic typhus was well established in 1931 (1,2). Following Dyer's report (3) on the experimental infection of the woodchuck, meadow mouse, and whitefooted mouse with endemic typhus, Brigham (4, 5) indicated that many species of rodents and other mammals were apparently susceptible to endemic typhus. Sparrow (6) recovered a strain of endemic typhus rickettsiae in the house mouse (*Mus musculus*), as did Brigham (7) with his experiments on a field mouse (*Peromyscus* sp.).

In view of the wide distribution of endemic typhus in commensal rats in Lavaca County reported by Irons and associates (8), inquiry into the possible occurrence of infection in other small mammals seemed worth while. Morlan and co-workers (9) used the complement fixation test as an indication of natural infection, but Rickard and Worth (10) considered the findings on the wild-caught cotton rat (*Sigmodon hispidus*) to be nonspecific.

Methods

Live animals were captured in 1945 and 1946 near Hallettsville, in southeast Texas. Generally, the ectoparasites were identified while alive. The ectoparasites to be tested for typhus were appropriately pooled and stored on dry

ice under glass seal. The animals' brains were removed for tissue infectivity tests and were also stored on dry ice. Tests of the tissues of serologically reactive animals and pools of their fleas aided in evaluating the significance of low titers.

Blood samples were obtained by cardiac puncture soon after capture of the animals. Serums were separated aseptically and were kept at ice-box temperature until examination. Serums were inactivated 30 minutes immediately before testing at 56° C. Each serum was subjected to a quantitative complement fixation test employing endemic typhus rickettsiae. A slight modification of the procedure described by Brigham and Bengtson (11) was used. The result was recorded as reactive when a 3+ or greater reaction was obtained with satisfactory controls at a 1:20 or greater dilution of serum.

When a serum was reactive, the corresponding brain suspension was emulsified and inoculated individually into hamsters for evidence of typhus. With negative serologic findings, the brains of animals of the same species, particularly from the same trapping area, were similarly tested in pools of varying number. Pools of fleas from the same host species taken in the same area were similarly tested. Each hamster was bled twice, both before inoculation and 3 or 4 weeks later, and the serums were run in the quantitative complement fixation test. With positive findings, titers tended to be high on the second bleeding. This was the procedure recommended by Plotz, Wertman, and Bennett (12) for identifying rickettsial agents isolated in guinea pigs or mice. The utilization of specific complement fixation tests is much more economical than cross immunity and other tests in the guinea pig for identifying endemic typhus rickettsiae. A summary of findings is shown in the table.

The brain tissues of 3 of 17 house mice (*Mus musculus*) taken from 3 of 44 places surveyed yielded typhus rickettsiae. Most of the house mice were trapped on premises in close association with commensal rats. Curiously enough, those trapped in the fields were uniformly negative. Native rats and mice were found strictly in the fields. Tests of the brain tissues from the cotton rat (*Sigmodon hispidus*), the pack rat

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Results of complement fixation tests for typhus fever on animal serums

Mammal species	Total number tested	Percentage reactive	Titer percentage		
			1:20	1:40	Above 1:40
<i>Didelphis virginiana</i> (opossum).....	27	6.9	6.9	-----	-----
<i>Neotoma floridana</i> (pack rat).....	14	14.2	7.1	7.1	-----
<i>Blatomys taylori</i> (field mouse).....	101	0	-----	-----	-----
<i>Sigmodon hispidus</i> (cotton rat).....	62	8.0	8.0	-----	-----
<i>Spilogale indianola</i> (civet cat).....	2	0	-----	-----	-----
<i>Mus musculus</i> (house mouse).....	216	7.8	.9	4.6	2.3
<i>Perognathus hispidus</i> (pocket mouse).....	3	0	-----	-----	-----
<i>Peromyscus leucopus</i> (white-footed mouse).....	5	0	-----	-----	-----
<i>Geomys brevicauda</i> (gopher).....	28	0	-----	-----	-----
<i>Procyon lotor</i> (raccoon).....	13	0	-----	-----	-----
<i>Reithrodontomys fulvescens</i> (harvest mouse).....	9	0	-----	-----	-----

(*Neotoma floridana*), and the opossum (*Didelphis virginiana*) were uniformly negative.

A pool of 20 fleas (*Ctenocephalides felis*), collected from two opossums at Hallettsville in the summer of 1946 and not previously reported, gave an unequivocal positive test for typhus. These opossums were trapped in an oil mill which had not been dusted with DDT. The opossums showed negative complement fixation tests. Eight pools of fleas collected from negative rats and mice and tested for harborage of typhus rickettsiae gave negative results.

Discussion

Although occasional serums from cotton rats, wood rats, and from an opossum were reactive in the complement fixation test for endemic typhus, the titers were relatively low. However, similar findings on commensal rats probably would have been considered as evidence of infection or immunity to typhus. Low titers and failure to demonstrate the infectivity of brain tissues of cotton rats, pack rats, or opossums cast doubt on the specificity of serologic findings on these animals. The percentage of house mice showing positive serologic findings was also relatively low, but the titers were not invariably low, and endemic typhus rickettsiae were obtained from the brains of three house mice. The relatively few places harboring house mice with evidence of past infection contrasted sharply with findings for the domestic rat (8).

The finding of typhus rickettsiae in a pool of fleas collected from the two opossums, and in

other pools of fleas collected from nonmurine hosts (13, 14) was perhaps fortuitous, as it is possible that the fleas had acquired the infection from rats. At any rate, these findings do not in any way detract from the primary role of commensal rats in the epidemiology of endemic typhus fever.

Summary

Endemic typhus rickettsiae were recovered from brains of three house mice taken from human habitations and from a pool of 20 fleas collected from two opossums.

House mice trapped in fields were uniformly negative.

Unequivocal evidence of typhus in small mammals other than commensal rats and mice was not obtained.

Serologic findings on the pack rat, cotton rat, and opossum were of doubtful significance.

ACKNOWLEDGMENT

The Lederle Laboratories, Pearl River, N. Y., supplied the endemic typhus antigen used in the study.

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given State may vary markedly from the provisions applicable to counties and districts. It is also apparent that certain types of local governmental units are frequently exempt from general statutory provisions, but are covered by special statutes not generally applicable to all local governmental units.

The existence of specific statutes dealing with various classes of local governmental areas does much to complicate the establishment of local health departments. For example, in one State there are six classes of local governmental areas which may form a local health department, provision being made for each class under a different set of statutes. New legislation introduced under these circumstances frequently only adds another procedure by which local health departments may be formed, rather than clarifying and simplifying the several existing provisions for the formation of local health departments.

Local Boards of Health

Local boards of health are mandatory by statute in at least some type of local governmental area in 41 States. Six other States have permissive provisions for boards of health applicable to some local governmental areas. There is only one State in which no statutory provision, either mandatory or permissive, is made for boards of health. Regulations for the establishment of local boards of health exist in only two States, and in both of these States statutory requirements also are present. Although provided for by law, local boards of health do not actually function in some States.

Table 1 indicates that in 24 States, boards of health are provided for by mandatory statutes generally applicable only to local areas. Three States have mandatory provisions applicable only to cities. Four States have permissive authority which is generally applicable to local areas, and 2 States have such provisions applicable only to cities. There are 14 States in which it is mandatory for some governmental areas to have boards of health while it is permissive for other areas to have them. There are 3 States in which current statutes require local areas to have boards of health, but legislation recently enacted makes it permissive for

Table 1. Number of States having mandatory or permissive statutes for establishing local boards of health, by type of statutory provision¹

Type of statutory provision	Number of States ²
Mandatory provisions only.....	27
Mandatory statute generally applicable to local areas.....	24 (5)
Mandatory statute applicable only to cities.....	3 (3)
Mandatory and permissive provisions.....	14
Mandatory in some local areas but permissive in others.....	11 (8)
Mandatory under current law but permissive in units established under new legislation.....	3 (1)
Permissive provisions only.....	6
Permissive statutes generally applicable to local areas.....	4
Permissive statutes applicable only to cities.....	2 (2)
No mandatory or permissive provisions.....	1

¹ Since the basic governmental unit in New England is the town, the data for these States have been included in the same category as county data for the other States.

² Figures in parentheses indicate the number of States included in the tabulation in which the provision is applicable only to certain local governmental areas or only under certain conditions.

newly created health departments to have such boards.

State health officers, when asked to comment on the advisability of local boards of health, almost unanimously expressed the opinion that such a body should exist, but expressions as to its function varied widely. Three State health officers questioned the desirability of a local board, 7 felt it should function as an advisory body only, while 33 felt that it should serve as a policy-making body through the adoption of rules and regulations.

District Boards of Health

Districts may be defined as a health jurisdiction which encompasses more than a single local governmental area. Such districts may be city-county, multicounty, multicity, or any other combination of local governmental areas. Thirty-six States provide through statute for some type of board of health in districts and one State does so by generally accepted practice.

There are three general types of boards of health established in areas comprising health districts: (a) A district board of health repre-

senting all constituent areas within the district; (b) both a district board of health and separate boards for each constituent area; and (c) a separate board of health for each constituent governmental area within the district (table 2).

Twenty-nine States provide for the first type by statute. Five States have statutory provisions for district boards of health which provide that the district board be composed of members of the several separate boards of health of the individual governmental areas of the district. Under such a plan, each constituent area has a separate board of health and also has representation on the district board. Two States provide by statute for a separate board for each constituent area, and one State does so by commonly accepted practice.

Appointment of Boards

Statutes sometimes name certain local legislative or administrative officials who shall constitute the board of health, or in other instances the responsibility for the appointment of the board may be delegated by law to either the local legislative body or some administrative official. The State health officer or the State board of health appoints local boards of health in a few States. Representatives on district boards of health are generally appointed either by the local legislative body or an administrative official of each constituent governmental unit in the district. Sometimes members of

Table 2. Number of States in which district boards of health are provided by statute or common practice, by type of board

Type of board	Statute ¹	Common practice
District board representing all constituent areas-----	29 (2)	-----
Both a district board and separate boards for each constituent area-----		
Separate board for each constituent governmental area-----		
Total-----	36 (6)	1

¹ Figures in parentheses indicate the number of States included in the tabulation in which the provision is applicable only to certain governmental areas or only under certain conditions.

the legislative body or an administrative official of each constituent area serve on the district board.

Almost universally State health officers in commenting on the method of appointing local boards of health indicated that members of such boards should be appointed by the local legislative body or by an administrative officer. A few State health officers pointed out that a primary consideration was that appointments be nonpolitical in nature. The statutes of some States specifically limit the number of board members that may be from the same political party.

Local Board Representation

Table 3 indicates that 34 States have statutes which provide for professional representation on boards of health, but in 15 of these States such provisions are limited to certain areas or conditions in their application. Two States provide for professional representation by commonly accepted practice under certain conditions. Professional representation usually consists of one or more doctors of medicine, but in a limited number of States dentists and pharmacists are also included. By prescribing that certain officials constitute the board of health, some States practically preclude professional representation on such boards. Most State health officers felt that the medical profession should be represented on boards of health, but one-third of them indicated that physicians should not constitute a majority of the membership.

Nearly three-fourths of the States provide that certain local administrative officials shall be members of the board of health by reason of some other county or city office which they hold. In 14 States such provisions are applicable only to certain areas or are qualified as to the conditions under which they are applicable. Frequently, separate statutory provisions applicable to cities or to districts exist in addition to the general statutes.

Two-thirds of the States have statutes which require geographic representation on district boards of health. One State requires such representation through commonly accepted practice without a statutory provision.

Table 3. Number of States having membership or procedural requirements for local boards of health prescribed in statutes or commonly accepted practices which have general or limited application

Membership or procedural requirements	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Common practice	Statute	Common practice	Statute	Common practice
<i>Membership requirements</i>						
Representation:						
Professional.....	34	2	19	-----	15	2
Local administrative officials.....	34	-----	20	-----	14	-----
Geographic.....	31	1	23	1	8	-----
Local legislative body.....	23	1	12	1	11	-----
General public.....	19	-----	9	-----	10	-----
Health officer:						
Regular member.....	16	1	4	-----	12	1
Ex-officio member.....	19	2	7	1	12	1
Not a member.....	16	4	9	3	7	1
<i>Other requirements</i>						
Residence in health jurisdiction.....	33	6	25	6	8	-----
Eligibility to vote in jurisdiction.....	13	6	10	5	3	1
Taxpayer in jurisdiction.....	3	3	1	2	2	1
<i>Procedural requirements</i>						
Meetings:						
Regular.....	29	-----	18	-----	11	-----
Special ²	28	5	20	4	8	1
Quorum required ²	18	9	10	5	8	4
Meetings governed by bylaws ²	15	4	5	1	10	3
Compensation of board members:						
Travel.....	17	3	11	1	6	2
Per diem.....	14	4	6	1	8	3
Salary.....	7	1	1	1	6	-----

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

² One State has regulations governing these items.

There are 23 States in which members of the local legislative body by statute constitute all or some part of the board of health, but in 11 States such representation is limited to certain conditions or areas. In one State this type of representation is established by common practice.

In recent years there has been considerable interest expressed in having the general public represented on boards of health. The questionnaires reveal that 19 States have statutory provisions requiring the general public to be represented, but in 10 of these there are limited conditions under which such representation occurs. There are 8 other States in which representation of the general public is excluded because these States generally have statutory provisions which name specific officials or mem-

bers of the legislative body to the board of health, with no opportunity for the general public to be represented. It is interesting to note that three-fourths of the State health officers commented that there should be representation of the general public on local boards of health.

One-third of the States have statutory provisions permitting the local health officer to serve as a regular member of the board of health. Twenty-one States permit local health officers to serve as ex-officio members of boards of health. However, the service of health officers as regular or ex-officio members of boards of health is usually limited to certain classes of local areas or only to certain conditions.

It is obvious from the foregoing that there is little uniformity among the States as to the

membership representation on local boards of health. Frequently, more than one of the groups mentioned are represented. Legislative members, local administrative officials, and the medical profession are the most prevalent groups included in membership. In addition, the majority of the States include the health officer as either a regular or ex-officio member of the board, although there are at least 20 States in which he is not a member of boards serving at least some local areas.

Other Membership Requirements

Table 3 also indicates that statutes in more than two-thirds of the States require members of boards of health to be residents of the health jurisdiction. In addition, six States have this requirement in practice. Statutes in about one-quarter of the States require that board members be eligible to vote in the jurisdiction, while six other States make this a practical requirement. Statutes are generally silent with respect to the requirement that board members be taxpayers in the area.

Term of Office

Wide variation exists in the term of office for members of local boards of health, although

statutes in most States prescribe the term. About one-third of the States specify terms of 2 years or less. Ten States have statutes calling for an indefinite term of membership for all or some local boards of health. It should be pointed out that a State frequently has statutory provisions which specify a different tenure for members of local boards serving counties and for those serving cities. More than half the States have statutes which provide that the expiration dates for terms of board members shall be staggered so as to give some continuity to the board.

Procedural Requirements

Statutes in 29 States specify that boards of health shall hold regular meetings and indicate the frequency of such meetings, although such provisions are of limited application in 11 States. Predominantly, meetings are held monthly or quarterly, with the latter taking some precedence over the former interval. Slightly more than half the States have statutory provisions establishing a procedure for calling special meetings of boards of health.

Statutory specification of minimum frequency of board meetings was favored by three-fourths of the State health officers. The majority stated that legal provisions should pre-

Table 4. Number of States providing for appointment of local health officers by statute or commonly accepted practice, according to type of appointing authority

Appointing authority	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Common practice	Statute	Common practice	Statute	Common practice
Health officers of single governmental areas:						
State health officer.....	12	1	3	1	9	
State board of health.....	7		2		5	
Local board of health.....	32	3	23	1	9	2
Local legislative body.....	22	1	10	1	12	
Local administrative official.....	15	2	1		14	2
Health officers of districts:						
State health officer.....	7	5	5	4	2	1
State board of health.....	2		2			
District board of health.....	28		25		3	
Local board of health in each unit.....	4	1	4	1		
Local legislative body in each unit.....	1	1	1	1		

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

² One State has regulations in addition to statutes covering this authority.

Table 5. Number of States providing for confirmation of local health officers by statute or commonly accepted practice, according to type of confirming authority

Confirming authority	Total states with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Common practice	Statute	Common practice	Statute	Common practice
Confirmation in single governmental areas:						
State health officer.....	11	7	7	3	4	4
State board of health.....	9	1	6	1	3	-----
Local legislative body.....	9	1	2	1	7	-----
Local administrative official.....	1				1	-----
Local board of health.....	1	2	1	2		-----
Confirmation of district health officers:						
State health officer.....	11	-----	9	-----	2	-----
State board of health.....	6	-----	6	-----		-----
Local legislative body of each unit.....	4	1	2	1	2	-----
District board of health.....	-----	2	-----	2		-----

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

scribe the minimum number of meetings, with provisions for special meetings whenever local conditions demand.

The data indicate that boards of health are required to have a quorum by statute in 18 States and by generally accepted practice in 9 other States. Only 15 States have statutes specifying that deliberations of boards of health be governed by bylaws. In addition, there are four States in which the actions of boards are so governed in practice.

In 20 of the States members of local boards of health are entitled to travel expenses either by statute or by commonly accepted practice. In 14 States they receive per diem by law, and in four other States by accepted practice. In only eight States are members of local boards of health entitled to receive salaries.

Appointment of Local Health Officers

Many States have more than one provision for the appointment of health officers. The methods of appointment are associated generally with the methods for establishing local health departments. Some statutory provision for the appointment of local health officers exists in every State, although such provisions are frequently limited in their application to certain areas or conditions. Table 4 indicates that local health officers serving units other than districts are usually appointed by the lo-

cal board of health, the local legislative body, or the State health officer. There are 20 States in which either the State board of health or the State health officer may appoint certain local health officers. However, this power is usually limited to instances in which the regular or local appointive machinery breaks down.

Health officers serving districts are appointed under statutory provisions by the district board of health in 28 States and by the State health officer in 7 States. In addition, there are five States in which district health officers are appointed by the State health officer by accepted practice. Local legislative bodies seldom appoint district health officers, and appointment by a local administrative official was not found.

Twenty-nine States have statutory provisions for the confirmation of the appointments of health officers, while nine other States follow this procedure in practice. Generally, the State health officer, State board of health, or the local legislative body is delegated the authority to confirm the appointments of local health officers. Confirmation of the appointment of district health officers occurs infrequently, but where confirmation is required the State health officer or the State board of health is usually delegated this responsibility.

The consensus of State health officers is that the local health officer should be appointed locally—either by the board of health or the legislative body. However, 28 indicate that his ap-

pointment should be confirmed by the State health officer. Twelve others recommend that he should be required to meet specifications of the State health department, but that the appointment should not actually be confirmed. Eight believe that he should be appointed by the State health officer or State board of health.

Other Provisions for Health Officers

In seven States local health officers serving some types of local health departments become deputy State health officers by law. In eight other States they hold this position through commonly accepted practice.

Statutes in nearly three-fourths of the States provide that at least some cities, towns or townships may retain a local health officer even though the governmental area itself becomes part of a larger health jurisdiction. The comments clearly indicate that State health officers generally oppose the retention of a legally designated health officer in minor governmental areas of a health jurisdiction. It is the opinion of State health officers that the health unit director should exercise the authority of health officer throughout the health jurisdiction and that any other health officers should be subordinate to him.

By statutory provisions, local health officers serving at least some types of local health departments are selected in 16 States under a merit

system. Seven additional States have regulations to this effect, and eight States select local health officers in this manner by practice. In those States in which the law specifically indicates the manner in which local health officers shall be appointed, such procedures may preclude his selection under a merit system. Thirty-nine State health officers indicate that it is desirable for local health officers to be selected under a merit system.

There is wide variation in the statutory provisions for term of office for local health officers and equally wide variation in the accepted practice where no statutory requirements exist. The questionnaires indicate that local health officers most frequently have either a 2- or 4-year term of office. There has been a definite trend in recent years for the term to be made indefinite. In several of the States with statutory provisions specifying the term of office there is actually no reappointment of health officers at the intervals specified.

Qualifications Required

More than two-thirds of the States require by law that local health officers possess the qualifications for a State license to practice medicine (table 6). In five States this requisite is specified by regulation, and in two States the requirement is by common practice. Most of the States with stipulations that the health officers

Table 6. Number of States prescribing specific qualifications for local health officers by statute, regulation, or common practice

Type of qualification	Total States with provisions			States with provisions generally applicable			States with provisions of limited application ¹		
	Statute	Regulation	Common practice	Statute	Regulation	Common practice	Statute	Regulation	Common practice
Qualified for State license in medicine ²	34	5	2	27	4	2	7	1	-----
Required to secure State license in medicine ²	32	4	4	25	3	4	7	1	-----
Provisions for temporary licensure in medicine.....	11	1	2	11	1	2	-----	-----	-----
Full-time service.....	31	3	5	12	2	3	19	1	2
Training in public health.....	17	8	2	7	4	1	10	4	1
Experience in public health.....	7	10	1	2	8	1	5	2	-----

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

² Required by regulation in two States as well as by statute.

Table 7. Number of States with statutes or commonly accepted practices designating governmental authority to which local health officer is responsible, by type of authority

Type of authority to which health officers are responsible	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Common practice	Statute	Common practice	Statute	Common practice
Responsible authority in single governmental areas:						
State health officer.....	19	2	18	2	1	-----
State board of health.....	8	-----	7	-----	1	-----
Local board of health.....	35	4	27	2	8	2
Local legislative body.....	12	4	6	4	6	-----
Local administrative officer.....	9	2	2	1	7	1
Responsible authority in districts:						
State health officer.....	13	3	13	3	-----	-----
State board of health.....	1	-----	1	-----	-----	-----
District board of health.....	29	3	28	3	1	-----
Each constituent governmental area.....	3	4	2	4	1	-----

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

qualify for a State license actually require them to secure the license. Only 11 States make statutory provisions for temporary licensure of health officers, one additional State provides for such licensure by regulation, and two States do so by practice.

The laws of 31 States require at least some health officers to serve full time though such statutes are generally limited in their application (table 6). In addition, three States have regulations requiring full-time service and five States require it by accepted practice. Frequently, the regulatory requirement or practice of requiring full-time service of local health officers is related to the health department's eligibility for State financial assistance.

Twenty-seven States require public health training of local health officers serving at least some types of health departments. Such requirement is twice as frequently specified by statute as by regulation. Usually, the provision is general, not specifically stating the amount or kind of training required.

Only 7 States require by statute that health officers have experience, but 10 States have regulations requiring experience. The present shortage of qualified health officer personnel has made difficult the enforcement of experience requisites in existing statutes and regulations.

The majority of State health officers were opposed to defining qualifications of local

health officers in statutes. The major objection indicated was that specificity in this matter makes conditions too rigid and hampers the recruitment of personnel. Many indicated that qualifications, if defined, should be set forth in State health department regulations rather than in statutes. A number favored a flexible system, with required training and experience commensurate with the size and complexity of the individual health unit. Nearly all State health officers felt that local health officers should be legally licensed physicians. Several State health officers indicated that such items as personality, administrative ability, interest in community health, and ability to get along well with people are more important than specified training or experience backgrounds.

Responsibility of Local Officers

Table 7 indicates that State statutes and practices hold local health officers responsible to several types of governmental authorities. In many instances the health officer is responsible to more than one authority and is frequently responsible to some authority other than the one which appointed him. In most cases when dual responsibility exists, the health officer is responsible to some local authority and to the State health officer. Table 7 indicates that the local health officer is most frequently responsible to

the local board of health or to the State health officer.

The data also reveal that district health officers are infrequently responsible to the separate governmental areas comprising their district, but are usually responsible to the district board of health or to the State health officer.

Governmental Basis of Health Units

For several years health experts have been interested in the types of local governmental areas which may establish health departments. There are now 42 States which have statutes making it possible to establish single county health departments. The six States which have no legal provisions for establishing single county health departments are located primarily in the New England area where the county as a local governmental area has practically no meaning. The establishment of single county health departments is mandatory in four States. Laws governing the establishment of city health units are in effect in 44 States and such units are established in common practice in 1 other State. In eight States it is mandatory for all or some cities to establish local health departments, while in four States cities are not permitted to establish separate health departments.

The fact that most counties in the United States have insufficient population and financial resources to meet the high costs of maintaining a separate local health unit, plus the shortage of qualified health officers, has spurred the development of district health departments to serve more than a single local governmental unit. Legislation is usually necessary to permit local governmental areas to combine and form a district for the operation of a health department. There are now 34 States which have statutes permitting 2 or more counties to form a multicounty health department; in 2 States such districts have been formed without specific legal authority. There are 27 States which have legislation permitting the creation of city-county health departments, and 5 States have established this type of district in practice without specific statutory authority. These foregoing two types of district health depart-

ments are the most prevalent, but statutes exist in several States which permit the formation of other types of districts. The laws of 15 States permit multicounty units and a like number permit multitown or multitownship units; 11 States permit the combination of cities and townships; 10 States permit the combination of counties, cities, and townships; and 8 States permit the combination of counties and townships. In addition, a few States have established these more unusual types of districts in practice although no statutory authority exists.

Methods of Establishment

There are several methods by which local health departments may be established. Local health departments serving either single units of government or those serving multiple governmental areas are most frequently established through action of the local legislative body or, in district areas, of each constituent legislative body within the district (table 9). The second most popular method is by referendum of electorate. This method is permitted by law in 16 States with respect to single governmental

Table 8. Number of States having permissive or mandatory authority for the establishment of local health departments, by type of governmental area¹

Type of governmental area	Permissive authority ²		Mandatory authority ²	
	Statute	Practice	Statute	Practice
Counties.....	38 (2)	-----	4 (2)	-----
Cities.....	36 (4)	1	8 (5)	-----
Towns or townships.....	16	1	2 (1)	-----
Districts:				
Multicounty.....	³ 34 (1)	2	1	-----
City-county.....	27	5	-----	-----
Multicity.....	15	2	-----	-----
Multitownship.....	15 (2)	2	-----	-----
City-township.....	11	3	-----	-----
County-city-township.....	10 (1)	3	-----	-----
County-township.....	³ 8 (1)	2	-----	-----

¹ Authority for establishing local health departments is not prescribed by regulation in any State.

² Figures in parentheses indicate the number of States included in the tabulation in which the provision is applicable only to certain governmental areas or only under certain conditions.

³ In 1 State statute is applicable under certain conditions and practice is applicable in other situations.

Table 9. Number of States providing specific procedures for the establishment of local health departments by statute or commonly accepted practice

Type of procedure	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Common practice	Statute	Common practice	Statute	Common practice
Single governmental areas:						
Action of local legislative body.....	37	4	22	3	15	1
Referendum of electorate.....	16	1	13		3	1
Action of State legislature.....	5		3		2	
Action of State health officer.....	4	2	3	2	1	
Other procedures.....	2	1			2	1
Multigovernmental areas:						
Action of local legislative body of each constituent unit.....	35		22		13	
Referendum of electorate.....	17		14		3	
Action of State health officer.....	8	4	6	4	2	
Approval of local authorities required.....	3	2	3	2		
Action of State legislature.....	2		2			
Other procedures.....	6		6			

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

areas and in 17 States with respect to multiple governmental areas. This plan normally requires that a certain percentage of electors submit a petition asking that the question of creating a local health department be placed upon the ballot. Local health units of either the single-unit type or district type are infrequently established by action of State health officers or State legislatures, although such methods are permitted by law in several States.

It is the opinion of State health officers that the establishment of local health departments is a matter for local determination. A few State health officers indicated that State legislative action should make them mandatory. Local legislative action or local referendum, or a combination of the two, were deemed by State health officers as the most expedient methods for initiating action to establish local health departments. The same general methods were favored for the establishment of district health departments. More State health officers, however, felt that in order to foster some logical plan for state-wide districting, such departments should be subject to the approval of the State health officer.

Dissolution of Local Units

Statutes usually fail to specify the manner in which local or district health departments may

be dissolved. In 15 States there are no statutory provisions for the dissolution of health units. Action by the local legislative body is the most frequent method employed to dissolve a health department; 15 States have such statutory authority with respect to single governmental units and 13 States with respect to multigovernmental units. Such action is taken by commonly accepted practice in 13 States for single county units and in 11 States with respect to district health departments (table 10). Referendum of the electorate is the second most popular method for dissolving local health departments, with 6 States making this method applicable to single governmental areas. Seven States provide by statute for the dissolution of districts by referendum action of the electorate of the whole jurisdiction while 6 States provide for referendum of electorate of each constituent area. In several States it is most difficult to dissolve a local health department once established.

State health officers feel that dissolution should be by the same procedure as establishment. Several indicated, however, that a health department should be in operation for at least a reasonable period of time before dissolution should be permitted. Many who indicated that establishment should be by either referendum or local legislative action were of the opinion

that dissolution should not be permitted without referendum. The majority of State health officers felt that the desirability of withdrawing from a district should be determined by each governmental unit. However, they also felt that provisions should be made for a waiting period, or a period following notification of withdrawal, to allow for adjustment in the remainder of the unit.

Table 11 indicates that only 4 States require all governmental units within a county or district health jurisdiction to join the health department. There are 10 States in which statutory provisions permit any type of city to remain outside county or district health departments; 10 additional States permit cities of specified population size to do so, and 7 States permit cities to remain outside the county or district unit if they have a health department of their own. There are a few States in which towns may also remain outside the county or district health department. On the other hand, almost three-fourths of the States permit cities and towns to join the county or district health jurisdiction,

Table 11. Number of States having provisions of statute and practice permitting local governmental areas to remain outside county or district health jurisdiction, by type of local governmental area

Type of governmental area permitted to remain outside county or district health jurisdiction ¹	Statute	Common practice
None.....	4	-----
Cities of any type.....	10	-----
Cities of certain classes or population size ²	10	-----
Cities with a health department.....	7	-----
Any city, county, or town.....	5	2
Cities or towns.....	4	2
Towns.....	2	-----

¹ Since the basic governmental unit in New England is the town, the data for these States have been included in the same category as county data for the other States.
² One other State has statutory provision permitting counties of certain population size to remain out of districts.

and 9 additional States do so in practice without statutory provisions.
 Statutory provisions require that districts serve contiguous local governmental areas in

Table 10. Number of States providing specific procedures for the dissolution of local health departments by statute or commonly accepted practice

Type of Procedure	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Common practice	Statute	Common practice	Statute	Common practice
Procedures in single governmental areas:						
Action of local legislative body.....	15	13	9	10	6	3
Referendum of electorate.....	6	3	4	3	2	-----
Action of State health officer.....	-----	7	-----	5	-----	2
Approval of local authorities required.....	-----	4	-----	3	-----	1
Action of State legislature.....	3	-----	1	-----	2	-----
Other procedures.....	10	-----	10	-----	-----	-----
Procedures in district areas:						
Action of local legislative body of each constituent unit.....	13	11	9	9	4	2
Referendum of electorate of whole jurisdiction.....	7	1	5	1	2	-----
Referendum of electorate of each constituent area.....	6	2	5	2	1	-----
Action of State health officer.....	2	8	1	8	1	-----
Approval of local authorities required.....	2	6	1	6	1	-----
Action of State legislature.....	1	-----	1	-----	-----	-----
Other procedures.....	7	-----	7	-----	-----	-----

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

Table 12. Number of States prescribing criteria by statute, regulation, or commonly accepted practice that must be met in order to be eligible for State financial assistance

Criteria prescribed	Total States with provisions			States with provisions generally applicable			States with provisions of limited application ¹		
	Statute	Regulation	Common practice	Statute	Regulation	Common practice	Statute	Regulation	Common practice
Mandatory staffing-----	² 6	4	11	4	4	10	² 2	-----	1
Specific services-----	3	4	12	1	4	7	2	-----	5
Plan required-----	2	1	15	2	1	12	-----	-----	3
Plan must have State approval.	2	1	12	2	1	12	-----	-----	-----
Minimum population-----	2	2	5	1	2	3	1	-----	2

¹ Refers to States where provisions are applicable only to some governmental areas or under some conditions.

² In 1 State mandatory staffing is required of districts by statute and of other local health departments by practice.

22 States; 5 additional States require such an arrangement by commonly accepted practice.

Only 5 States have statutory limitations as to the number of governmental areas which may combine to form health districts. Also, such limitations are infrequently imposed in practice.

State Financial Assistance

There has been some interest in recent years in the development of criteria which local health departments should meet in order to be eligible for financial assistance from the State. Such criteria generally include mandatory staffing requirements. Table 12 indicates that such staffing requirements are specified by statute in six States and by regulation in four others. In practice, there are 11 additional States which require local health departments to employ certain types of personnel.

A second criteria involves basic services which local health departments are required to render. Nineteen States have some requirements with respect to basic services, but in only 12 States are they generally applicable and in those they are usually applied in practice rather than by statute.

Local health departments infrequently are required by statute to submit a plan of action. However, nearly one-third of the States require such plans in practice. If a plan is required of the local health department, it is generally subject to approval by the State.

Criteria for State financial assistance sometimes include a minimum population which the department should serve, but only nine States require local health departments to serve a minimum population.

Summary

While most States have some statutory provisions for the creation of boards of health, the appointment of local health officers, and the establishment of local health departments, there is wide variation between the several States in the details of the statutory provisions. Basically, statutes provide for boards of health either appointed by or composed of members of the local legislative body, or local administrative officials. These boards generally have the responsibility of designating the local health officer who directs the local health department program. The health officer is usually responsible to the authority which appointed him, but, in addition, may be responsible to other local authority and particularly to the State health officer.

Most States have statutory provisions which permit the establishment of county or city health departments through action of the local legislative body or through popular referendum. Only about three-fourths of the States, however, have such legislation permitting the establishment of health districts serving more than a single local governmental area.

Abatement of Stream Pollution Caused By Industrial Wastes

By ROLF ELIASSEN, D.Sc.

INDUSTRIAL wastes, varied in nature and potent in strength, have been with us for a long time. But in recent years they have been increasing in volume and variety at a rapid rate.

Legislation is pressing industry and municipalities to abate the pollution of streams by controlling or treating their wastes. The times call for rational, economical decisions. To make them, every sanitary engineer needs to know a great deal more about the fundamentals of the sanitary engineering profession and its relationship to industrial wastes.

Throughout the years, sanitary engineers and sanitary scientists have developed and put into practice treatment processes involving chemical, physical, and biological phenomena characteristic of domestic sewage. Domestic sewages do not differ much, unless mixed with industrial wastes. And many civil engineers, with only a rudimentary knowledge of design criteria for treatment plants, can adopt the regulations of State health departments and proceed with plant designs. Through the efforts of sanitary engineers in these departments, design criteria have been made sufficiently liberal to insure adequate treatment under average conditions.

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Changing Needs

In recent years special problems have put new demands upon the ingenuity of sanitary designers and operating personnel. This is particularly true in cities having appreciable proportions of industrial wastes mixed with domestic sewage. Research has led to more economical and more easily operated processes, and many excellent treatment plants are in operation. Furthermore, many sanitary engineers are set to meet new demands from industry. But it must be conceded that rule-of-thumb engineering no longer applies successfully to the design of treatment plants for sewage and industrial wastes. This method may have done a good general civil engineering job for municipalities, but it may fail to abate water pollution if it is applied to industrial wastes.

Rarely will wastes from similar industrial establishments be exactly the same from plant to plant. They may fall into similar categories, but the concentrations and individual components may be far apart. Each waste requires special analysis and an approach based upon a sound knowledge of each unit operation which may be applicable in a treatment process. Rule-of-thumb approaches may lead to plants which may not operate properly or may not even accomplish the assigned task.

Engineer Cooperation

Many industrial wastes can be eliminated by process revisions within the industrial plant. In many cases, this is within the province of the chemical engineer. The field of wet-process

engineering, particularly within chemical and allied industries, is the province of the chemical engineer. This profession is gradually coming to realize that cutting down the volume and strength of industrial wastes is their responsibility.

Sanitary engineers must cooperate with chemical engineers in this work, and it is necessary for them to learn enough about the chemical engineering field to make that cooperation intelligent and beneficial. After chemical engineers have completed process changes within the limits of economics, many plants find it necessary to discharge liquid wastes having sufficient concentration of pollutants to require treatment. The determination of the economics of process changes versus treatment of wastes, either individually or when mixed with municipal sewage, can best be accomplished by close cooperation between chemical engineers and sanitary engineers.

The sanitary engineer has wide experience with chemical and biological processes for the removal of dilute concentrations of solids, both organic and inorganic, from liquids and the processing of these solids for ultimate disposal. His is also the best qualified profession to deal with problems of stream sanitation, including the biochemical processes of stabilization of organic matter in streams. Toxicity of the constituents of industrial wastes to the biological population of streams has been the subject of extensive studies by sanitary engineers and sanitary scientists. One of the most important contributions of the sanitary engineer to the economics of waste treatment is his knowledge of the capacity of municipal sewage treatment plants and of streams to absorb organic pollutants. Thus, his education and experience can be utilized for the evaluation of the extent of treatment required before industrial wastes may be discharged into municipal sewers or directly into streams and for the design of plants to accomplish this treatment.

Tailor-Made Solutions

There can be no pat formulas, no magic keys to success, for solutions to the hundreds of categories of industrial wastes which must be treated and bodies of water which must be pro-

tected. The quality of sanitary engineering service will be judged by the thoroughness with which each problem is approached and the ingenuity with which economical processes are developed and effective treatment plants designed. In most cases, satisfactory solutions can only be attained by complete chemical and physical analyses of the wastes, which are correlated with existing information in the literature of sanitary engineering and followed by laboratory and perhaps pilot plant tests. The day of reference to time-worn design criteria for a general class of wastes is past. Each problem demands particular attention and a tailor-made solution.

Each unit operation of the sanitary engineer must be based on the application of sound principles of the fundamental sciences of chemistry, biology, physics, and mathematics if effective and economical processes are to be developed. Therefore, the sanitary engineer must not only be qualified by his basic education in civil engineering to conceive and construct hydraulic structures, but he must also be well educated in the sanitary sciences built upon biology and chemistry. The major difference between a chemical engineer and a sanitary engineer is the primary reliance of the former on physical and chemical phenomena in his operations, whereas the sanitary engineer has command of biological as well as physical and chemical actions in the unit operations employed in sanitary engineering processes. In some instances, the sanitary engineer may be classified as a biochemical engineer to distinguish him from the chemical engineer.

Therefore, sanitary engineers of the present and of the future must be far ahead in the field of biochemistry. They can only achieve this knowledge by a concentrated program of scientific education in colleges and continued study while engaged in the practice of sanitary engineering. The sanitary engineer cannot go it alone. He must have qualified sanitary chemists and sanitary biologists as members of his team. With the right combination of talents in these three major realms of sanitary engineering, this team can give distinguished service to industry and government in the abatement of stream pollution by the control and treatment of industrial wastes.

Research Uses

This team of engineers, chemists, and biologists must not only be devoted to the solution of existing problems by known unit operations in the design and operation of treatment processes, but must also be constantly striving for effective utilization of the phenomena of the fundamental sciences. Research in sanitary engineering has led to the present high standards of treatment of sewage and industrial wastes. The field for research is open for the development of rapid methods for the fermentation of organic wastes by aerobic and anaerobic processes. Witness the great strides being made by biochemists and soil microbiologists in the fermentation processes employed for the production of antibiotics. In a few short years, they have succeeded in increasing rates of production tenfold. Can we say the same for our biochemical processes? We should be and must be able to accomplish rapid fermentation so that processes may be economical and widely applicable to many wastes now outside the realm of treatment by our various unit operations.

We are necessarily faced with expanding horizons for our research workers who must incorporate many of the unit operations utilized by chemical engineers, such as absorption, extraction, distillation, evaporation, and others. The sanitary engineer and the chemical engineer must cooperate in developing processes utilizing the best of knowledge and experience from both professions.

Conclusion

Our keenest brains must be applied to the problems encountered in the treatment of industrial wastes and the abatement of stream pollution. Engineers must also divest them-

selves of any lingering illusion that they can quietly go their own fixed ways of applying empirical formulas to categorical problems. But we must be prepared to be patient and persistent in the pursuit of knowledge of the fundamental sciences to be applied to the critical problems of so very many different industrial wastes. We cannot afford to be thrown off balance by the demand for quick answers and simple methods. Proper solutions take time and cost money. Therefore, consulting engineers must be prepared to educate their clients to the need for sufficient funds and time to do the job thoroughly.

Allies in the fields of chemistry, biology, and chemical engineering must team up to make the changes deemed economical and necessary within the plant and then to apply their joint talents to the treatment of the liquids which must be discharged to streams of municipal sewers and treatment plants. Through knowledge of the principles of physical, biological, and chemical unit operations, and of stream sanitation, sanitary engineers must demonstrate that they can by economical design and operation make streams safe from the standpoint of public health, recreation, and beneficial use of water for the industries and cities downstream.

The key to future success lies in continued development through the application of the fundamental sciences. The cost of failure of the rule-of-thumb engineer to understand these fundamentals may be staggering. Therefore, let the sanitary engineer team up with the chemist, the biologist, the physicist, and the chemical engineer, and the future will hold great promise for more economical treatment processes and effective abatement of stream pollution.



The Movement Toward Sound Drug Therapy

1952 marked the celebration of the 100th anniversary of the founding of the American Pharmaceutical Association. It marked, as well, a step toward eliminating the confusion existing in the multiplicity of drugs available to physicians, dentists, and pharmacists. A new handbook, synthesizing the best available in modern drug therapy, was completed. "Basic Drugs: U. S. Public Health Service Hospitals and Clinics" will be used by the 18 hospitals and 22 out-patient clinics of the Public Health Service as their standard for the known therapeutic agents in the prevention and treatment of illness. The accompanying paper was presented, with somewhat more emphasis on the role of the pharmacist in the hospital, before the American Society of Hospital Pharmacists at the annual meeting of the American Pharmaceutical Association in Philadelphia on August 21, 1952. Reviewed below is the trend of professional criticism appearing in medical and trade journals over several decades.

1930 "The hospital . . . should afford unusual opportunities for enhancing rational drug therapy. There particularly may products be submitted to critical inspection. As Sollmann so pointedly remarked at the recent Congress on Medical Education [February 17-19, 1930], the 'evaluation of therapeutic remedies is not usually among the features to which hospital authorities point with just pride of achievement.' The hospital drug room, which reflects directly the medicinal requests of the staff, has hardly kept pace with the modernization of other departments. . . ."

—from an editorial in the *Journal of the American Medical Association*, May 31, 1930, p. 1764.

1941 "There is far too little correlation between pharmacology and drug therapy at the bedside. . . . As students and, subsequently, as practitioners they [physicians] had, and have the ordeal of trying to learn myriads of drugs. . . . Such thinly spread teaching and learning about hosts of drugs permeates the whole curriculum and medical practice in spite of available scientific criteria for charting drug actions in the clinic which make it possible, in most instances, to shun useless and irrational therapy. The results are particularly reflected in notoriously disreputable pharmacy stocks. . . ."

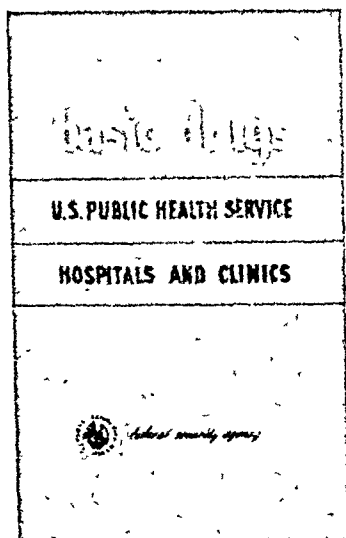
—from "Rational Drug Therapy in Hospitals" by Drs. M. S. Dooley and E. C. Reifenshtein in *Hospitals*, January 1941, p. 42.

1949 "A fundamental requirement to successful treatment is that the physician have the clearest possible understanding of the remedial agents that he prescribes. This is difficult at best, and is rendered increasingly difficult with multiplication of agents that are nearly but not quite equivalent. Each may show minor differences, which may or may not be practically important, but which are difficult to learn if he spreads his experience too widely and therefore too thinly. . . . There is another side to the argument, however, for few if any therapeutic agents are ideal. Improvements, increased efficiency, fewer side actions, and lower toxicity should be sought for. Skillful experimentation in this direction should be encouraged, not obstructed, but this thorough experimentation should precede the introduction into medical practice. It were better, much better, for medical practice . . . if modifications which do not offer substantial advantages were shunted into the discard before they see publicity and add to the confusion of practitioners."

—from a report of the Council on Pharmacy and Chemistry, American Medical Association, *Journal of the American Medical Association*, February 5, 1949, p. 378.

An Objective Approach to Drug Therapy

By J. SOLON MORDELL, B.A., Ph.G., and C. K. HIMMELSBACH, M.D.



In April 1952, Paul deHaen reported on pharmaceutical products introduced in the years 1948 through 1951. His report was based on a survey he made of trade and medical journals (1). The 1951 data are illustrative of the preceding 3 years. Among the 322

pharmaceutical products introduced by 86 manufacturing firms in 1951, there were 35 different single chemicals, or about 11 percent of the total. Also, deHaen found 74 instances of duplication of single chemicals—23 percent of the products introduced. And of especial note is this: There were 211 compounded items—66 percent of the 322 total different products introduced. In addition, there were 120 new dosage forms.

Here is telling evidence of how the word "new" has been abused in the field of drug

therapy. Such abuse calls for a distinction between what is really "new" in the sense that penicillin was new in 1943 and that which is a mixture of known drugs marketed under a new name or a duplication of the "new" drug under other names.

Without knowing at what rate drugs become obsolete and unavailable, we are convinced that the net effect is the addition of more and more drugs each year. Thus, discriminate selection becomes increasingly difficult by virtue of numbers alone, and the state of confusion is compounded.

With this vast numerical growth, and the rapid progress in therapeutics—for example, cortisone, aureomycin, chloromycetin, terramycin, isoniazid, in but a few years—there comes the need for improved procedures for clinical assessment. The problem is that of devising the best method whereby the physician and the dentist may be assisted in the difficult task of selecting suitable agents from the multiplicity of drugs and drug preparations which confront them.

The professional interdependence of medicine, dentistry, and pharmacy has been recognized for a long time. We have observed, in the Public Health Service, the development of a wholesome working interrelationship among the three sciences in their common search for an objective approach to sound drug therapy and to uniform drug nomenclature. Early in 1953, the Public Health Service will release "Basic Drugs: U. S. Public Health Service Hospitals and Clinics" (2), a handbook of drug therapy which is in every sense a significant achievement in meaningful teamwork. The climax of 4 years' cooperative study, its publication represents a noteworthy advance in

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the satisfying exercise of professional cooperation in trying to make some order out of a confused situation.

Can some order be achieved? How?

Valuable sources of information are available in the standard pharmacological texts and in "New and Nonofficial Remedies" of the American Medical Association; "Reports of the Council on Pharmacy and Chemistry of the American Medical Association"; "Accepted Dental Remedies" of the American Dental Association; and "Useful Drugs" of the Council on Pharmacy and Chemistry of the American Medical Association.

Formularies and other types of drug listing have been individually compiled in many hospitals. However good these listings may be for the specific purpose for which they were designed, many serve mainly as convenient references to indicate the items available in an individual institution. Often, they lack the important features of selectivity and simplification based on fundamental scientific clinical pharmacology. Furthermore, they frequently fail to include a base—a point of departure, a set of criteria—so necessary for an orderly approach to sound drug therapy.

"Standardization"

We hesitate to use the word "standardization" because to many it immediately connotes rigidity. It is therefore important to stress the fact that any plan in the direction of rationalization of drug use must be flexible, even though it does require adherence to certain fundamental principles. If this one concept is not understood and kept indelibly in view, no such plan can be effective in operation: it would lack effectiveness, for our purpose, because pharmacology is a dynamic field in which important changes may and do occur rapidly; it would not work because compulsive restriction to standards leads to defeated initiative and stultified thinking.

The obvious approaches to discriminate selection of drugs would appear to be to develop and keep alive an up-to-date standardization of basic clinical pharmacology as the keystone of drug therapy; and to enhance closer profes-

sional working relationships among the pharmacist, the physician, and the dentist.

Trend Toward Objectivity

One of the earliest, if not the earliest, organized programs which aimed at collaboration with the physician in the objective selection of drug agents was conceived in 1927 in Syracuse, N. Y. Dr. M. S. Dooley, then director of the department of pharmacology of the Syracuse University College of Medicine, and now emeritus professor, inspired and guided in that early pioneering action to clear up what was a chaotic situation.

Dr. Dooley's plan was set in motion at Syracuse University Hospital in 1932 when the idea of hospital pharmacy practice in association with a pharmacy committee was relatively new. As time passed, more hospitals adopted the idea until today it is accepted by many institutions as an integral part of their professional operations. A significant portion of the historic 1937 "Report of the Committee on Pharmacy" of the American Hospital Association was related to the experience at Syracuse in improving the whole field of drug therapy.

A similar reorganization plan of drug therapy procedure was instituted in the early thirties at New York Hospital in Cornell University Medical Center, New York, N. Y. Publication of their therapeutic conferences in the *Journal of the American Medical Association* and in book form has contributed much to the literature on this subject.

Handbook of Drug Therapy

Late in 1948, the Division of Hospitals in the Public Health Service Bureau of Medical Services initiated the preparation of a handbook which would embody primarily the principles of a sound but flexible system of drug therapy in the 18 hospitals and 22 out-patient clinics now administered by the division. The final handbook would in no way be limited to a list of items in the manner of the traditional formulary. The goal was improved therapy—a goal to be accomplished by cooperative effort which would discredit any implications of interference with personal prerogative.

Thirty-four Public Health Service officers, professionally representing medicine, dentistry, and pharmacy, contributed to the finished text of the new handbook, "Basic Drugs: U. S. Public Health Service Hospitals and Clinics." The pharmacy committee at the Public Health Service out-patient clinic in Washington, D. C., spearheaded the project with close support from the pharmacy committees of the Public Health Service Hospital in Baltimore, Md., and of other Service hospitals. Also, authorities in a number of leading universities and teaching hospitals were consulted.

The main objective of the study was to select the best, the simplest, the fewest, and the safest medicines currently needed in the prevention, diagnosis, and treatment of illnesses. In accomplishing this, the chief task often was one of eliminating duplication and overlapping of items rather than that of sorting out the good from the bad or indifferent. This was a difficult and time-consuming process, especially when it sometimes involved, as it did, giving up a favorite drug which had been successfully utilized over a period of years. As expected, most of the difficulties arose in those areas where fundamental knowledge was not truly adequate and where differing views were advanced by the "experts." In certain of such areas, the drugs selected represent compromises.

Selection Criteria

The following criteria were utilized in the selection of drugs for the handbook:

1. The primary criterion was therapeutic efficacy. Within this criterion, preference was given to items listed in "United States Pharmacopeia," "National Formulary," "New and Non-official Remedies," and "Accepted Dental Remedies."

2. Unnecessary duplication was avoided.

3. Drugs of secret composition were not considered.

4. Mixtures were included only when they provided substantial advantage over the individual components.

Barbiturates: An Example

In considering the scope of drugs to be selected, attention was given to the drugs repre-

sentative of the various pharmacologic or therapeutic groupings and the clinical needs to be met.

Typical of the selection process is the sequence of activities which led to the choice of certain barbiturates as basic hypnotics and sedatives:

1. The barbiturates, as a class, were compared with other U.S.P., N.F., N.N.R., and A.D.R. hypnotics and sedatives. It seemed clear that for general usefulness, the barbiturates represent the surest, simplest, and safest of the hypnotic and sedative drugs. Their range of usefulness extends from mild sedation through spasmolysis and hypnosis to general anesthesia. The therapeutic range of safety is relatively great, most of the unfortunate sequelae being deliberate rather than accidental.

2. Since the nature and degree of effect are largely a function of dosage, the truly basic differences which exist within this class relate to the rate at which they are rendered inactive in the body. This, in turn, affects their duration of action. From the standpoint of therapeutic need, clinicians agreed on four ranges of action: Short, intermediate, long, and ultra-short (anesthetic).

3. Selection of the best agents to meet these needs became the next stage in the process. After much deliberation over the qualities, reliability, official status, usage experience and related aspects, the choices in the short and long ranges were secobarbital and phenobarbital, respectively. Thiopental was the obvious choice for the ultra-short representative. However, most of the discussion centered upon the selection of a barbiturate of intermediate duration of action. After the pharmacy committee discussion narrowed the field to two drugs, the opinions of specialists and consultants were requested. It became clear that custom had been the determining factor in most instances. Since the balance in terms of familiarity of usage and in certain aspects of consistency of action seemed to favor pentobarbital, it was selected as the basic barbiturate for intermediate duration of action.

4. The next step was to prepare the material on this subject for incorporation into the manual. The pharmaceutical, chemical, pharmacologic, toxicological, and dosage information considered essential to the clinician, pharmacist, and nurse were prepared and presented to the pharmacy committee for comment, criticism, and suggestions. When a draft had been agreed upon, it was duplicated and given to the staff as a trial guide, and the pharmacy stocks were adjusted in line with the agreement. After a brief trial period of several months had shown that therapeutic needs were adequately met, the material was made available for joint consideration with the pharmacy committee of the Public Health Service Hospital in Baltimore. Subsequent to agreement with that committee, the material, along with the remainder of the manual, was sent to each major clinical facility of the

Public Health Service, and to national authorities, for their consideration.

5. The suggestions and criticism resulting from these reviews were integrated into the final product. This, in turn, was carefully scrutinized by the headquarters staff with especial reference to the actions which had been taken on the comments and suggestions received from the field stations.

Thus, in the processing of the material and the selection of the basic drugs in the class of barbiturates, as well as in all other classes, most of the clinicians in the Public Health Service have had an opportunity to have their views receive appropriate consideration. Hence, the end product truly represents one achieved by joint action and agreement.

At some future time, a significant number of physicians may find that one of these barbiturates doesn't meet normal expectations. That kind of opinion usually has meaning because it is formed from adequate, first-hand observation. It is an opinion which cannot be formed easily or reliably when a large number of like drugs are used without regard to relative advantage and the unnecessary duplication which may exist. It gives the pharmacy committee and the clinician a basis for reevaluating the drug, perhaps leading them to seek a replacement, or possibly a supplementary drug. They may find that the agent in question, despite its shortcomings, should be retained because it is the best available drug for the purposes required. Thus, the whole approach is kept as scientific, objective, and independent as this field permits.

The Scope of Basic Drugs

The treatment given the barbiturate group is illustrative of the other groups. The items finally selected then form the basis for the pharmacy supply of drugs and drug preparations. Except for nonbasic drugs temporarily stocked for investigational or other special committee-authorized purposes, the drug supply consists of the basic agents.

The field of drug therapy being what it is, additions or deletions are to be expected, and the clinician is encouraged to propose changes. A request for an addition is placed on the agenda for a forthcoming pharmacy committee meeting. When the prescriber finds it necessary

to use the drug before the scheduled committee discussion, a small supply is obtained for the particular patient if none of the available basic drugs is found adequate and if there is no immediate, serious objection to the proposed drug. At the meeting, the clinician requesting the drug presents the reasons for wishing to use it. After a general discussion, the pharmacy committee may vote for acceptance, denial, or a trial period of tentative acceptance.

This procedure does several things:

It maintains freedom of action for the prescriber within the framework of the scope of basic drugs.

The prescriber is encouraged to think through the reasons for wishing to add drugs or to drop previously accepted ones. If a proposal cannot stand on its merits in a free discussion among colleagues, there should be little regret about its demise.

The pharmacist, as a committee member and consultant in drug therapy matters, is given greater opportunity to apply his professional competency.

The adopted coverage, as presented in the new handbook, provides a standard of comparison for the evaluation of new therapeutic agents.

Finally, the adoption of a basic range of therapeutic agents and the procedure for going beyond it help provide the patient with the best in the way of established drug therapy.

Two examples may serve to illustrate the validity of this approach:

Surgeons have need for a safe, reliable, orally effective relaxant of skeletal muscle. A new drug reputed to have such effect was proposed for trial on certain patients selected with the cooperation of the chief of the surgical service. Disappointing results were reported about a year later to the pharmacy committee with a recommendation against stocking the drug in the pharmacy.

Surgeons also have need for a good sympatholytic agent. Here, too, they tried out the agent of their choice and reported the results. In this instance, however, they were impressed with the value of the drug in selected cases. Their recommendation that it be stocked as a nonbasic drug for such use and for future reevaluation as a possible basic drug was accepted.

Nomenclature

Drug names were another problem in the efforts to devise a procedure for promoting sound

drug therapy. There is the professional and economic problem of multiple drugs and drug preparations which differ in name only. There is also an element of safety to be considered.

Is it not as important to have a standard terminology for drugs as it is to have a standard terminology for names of diseases, for causes of death, and for the anatomy of the body? Accurate communication with respect to drugs is certainly of highest importance here and extends beyond that which exists between physician and pharmacist.

Various texts, devised as aids to medical terminology, have been prepared for the use of medical record librarians. But when it comes to drug names, the medical record librarian has met with frustration. The situation is of even greater concern to the nurse, who has to administer drugs. With these problems in mind, the following principles of drug nomenclature were adopted:

1. Official drugs listed in the "United States Pharmacopeia" or in the "National Formulary" are referred to by their official English titles. Examples are:

Hydrous wool fat—*not* lanolin.

Methyl salicylate—*not* wintergreen oil, *nor* gaultheria oil, *nor* betula oil, *nor* sweet birch oil, *nor* teaberry oil.

2. Nonofficial drugs listed in "New and Nonofficial Remedies" of the American Medical Association and in "Accepted Dental Remedies" of the American Dental Association are referred to by the generic, nonrestricted name assigned by the drug councils of the two professional associations. For example, chorionic gonadotropin, the N.N.R. generic name, is used instead of the numerous names listed for this agent.

3. In some instances, an official drug such as naphazoline hydrochloride having the trade name Privine Hydrochloride, or an N.N.R. drug such as lidocaine hydrochloride with the trade name Xylocaine Hydrochloride, is produced by one manufacturer and is obtainable only under the trade name. Such drugs are referred to in the handbook by the official name or by the N.N.R. or A.D.R. name, as the case may be, and are followed by the trade name in parentheses. The trade name is used in hospital prescriptions to avoid ambiguity where orders are given directly to a nurse. It seemed impractical and

pedantic to use the official name naphazoline hydrochloride, for example, when the drug is obtainable only as Privine Hydrochloride. It is especially impractical in instances where ampuls bear the label or imprint of the nonofficial name. Often, the drug later becomes available under the official name or under other trade names. Then the previously exclusive trade name is dropped, and a return is made to the common base: the official name or the generic nonofficial name.

By this attention to drug names, it is possible for all concerned—physician, dentist, pharmacist, nurse, medical record librarian—to speak the same language. Moreover, the pharmacist is able to discharge a professional function for which he is trained, that is, the selection of the best drug from the pharmaceutical standpoint. No longer is there need to overload the pharmacy with many brands of the same drug or drug preparation. And as to therapy, the physician need not be concerned with much more than the selection of the therapeutic agent and the dosage. He decides, for instance, that the patient should have aluminum hydroxide gel in stated doses. The pharmacist is free to select the best available product without having to burden the pharmacy with many brands of the same item.

The Pharmacist

The success of a program of sound drug therapy depends in large measure on the professional stature of the pharmacist. To some pharmacists, as to some physicians and dentists, this type of operation may mean a departure from deeply rooted pathways of thought and action, calling for a new perspective on their part in the handling of drugs. It calls for basic knowledge not only of technical pharmaceutical functions but of drug action and drug use as well and of the differences and shortcomings which may exist among drugs. It means an awareness, for example, that witch hazel water, which would not be included in the basic drug scope, is nothing more than alcohol, water, and a witch hazel aroma—that witch hazel water will do little more than will an aqueous, 14- or 15-percent dilution of alcohol. What is most important is the ability to present

this type of information in scientific and, above all, unobtrusive fashion.

In administration of the program, it should be understood that "Basic Drugs" is not an instrument of rigid control but is essentially the sine qua non for maintaining a coordinated approach to sound drug therapy. The prescriber is encouraged at every opportunity to demonstrate his reasons for wishing to add a drug to the basic list and is not refused a drug merely because it does not appear there. The whole objective will fail if the physician or dentist is in any way discouraged from questioning the existing list. On the contrary, they should be encouraged to be analytically critical. This will serve to improve this tool and to sharpen therapeutic acumen. The goal is improved therapy—not disciplinary control.

Several courses of action are open when the pharmacist who receives a request for a non-basic drug informs the prescriber that the drug is not currently stocked:

The prescriber may ask if a drug of like action is available.

Or the occasion may be such that the pharmacist can take the initiative by suggesting the available analogous drug. The prescriber may decide to use the available drug and then find that it is the equivalent of, or better than, his first choice. Whenever that happens, it is a confirmation of our selection methods.

If there is doubt about the basic drug, the pharmacist may encourage the prescriber to present the drug originally requested to the pharmacy committee for acceptance. If the occasion demands, the pharmacist will offer to secure the nonbasic drug for the patient, subject to approval from the chief of the service, until committee action is taken.

Core of His Activities

After the system is in operation, members of the medical and dental services become familiar with the procedure, and the rest is automatic.

Once the pharmacist is relieved of accumulations of unnecessary drugs, he can then focus his attention on the drugs which he knows represent the core of his activities. He is free to acquire complete knowledge about these drugs and to consider improvements in ways of administering them.

Would this mean less work for the pharmacist? Not necessarily.

Take cough preparations as one example. There are almost as many of these as there are coughers. Under the basic drug approach, the fundamental physiology of coughing was examined and the bases for therapy were determined. Ammonium chloride was selected for its general liquefying and expectorant effect to aid the removal of sputum from the respiratory passages. Codeine was selected to depress the cough reflex when the cough becomes excessive or futile. Finally, potassium iodide, subject to certain contra-indications to its use, was selected for liquefying especially tenacious sputum which has not yielded to other measures. The responsibility for devising suitable vehicles for these agents now resides with the pharmacist whenever their administration is desired in liquid form.

This illustrates a situation calling for additional work by the pharmacist since agents used previously may have been purchased instead of having been prepared in the pharmacy.

The Open-Staff Hospital

How does a system of sound drug therapy operate in an open-staff hospital?

Usually the approved scope of drugs, previously agreed upon by the chiefs of each service in collaboration with the pharmacy committee, is used as the basis for drug therapy on ward service. It is understood that only the basic drugs are stocked in the hospital pharmacy. Nonbasic drugs prescribed for private patients are purchased (for the patient and not for "stock") without delay and in the minimum available quantity. In time, physicians who attend on ward service are able to evaluate the basic drugs used, and, once assured of their soundness, usually employ the same drugs for their private patients. Soon there is a diminishing number of special purchases of nonbasic drugs except for those under investigation.

The critical factors involved in the operation of the system in such hospitals are these: the need for prior agreement on the part of the chiefs of each service; the selection of a physician as guiding hand in the program who is aware of the problems to be tackled and the

objectives to be achieved; and the collaboration of a pharmacist with the same awareness.

Drug Manufacturers

It should be understood that a program of sound drug therapy is directed toward a logical application of drugs in the treatment of illness. The pharmaceutical manufacturer serves an indispensable function in accomplishing that aim. Manufacturers who inquire about the new program are admittedly interested in its effect on their operations, but they are soon convinced that our interest in having an opportunity to assess the new, that is, really new and potentially effective therapeutic agents, equals their interest in bringing the new drugs to our attention. As in all competitive enterprise, here too there is just as much chance for the manufacturer to gain as to lose. Proposed drugs are given every consideration. A drug which is finally adopted after organized, careful scrutiny has the substance and the chance of survival that otherwise may not obtain.

Conclusion

Thus, an attempt has been made to keep the base—the point of departure—not the end, but

the means to the end of the soundest drug therapy available at this time. The degree to which this is successful depends on an appreciation of pharmacology as the basis for sound therapy, of the need to keep the base alive and up-to-date, and of the need for professional coordination of the fields of pharmacy, medicine, and dentistry.

The purpose of the foregoing has been to enunciate a principle of operation which has been found useful, but not to stipulate either method or content in detail. The circumstances brought about by certain existing confusion in the field of drug therapy led to the development of method and content designed to meet particular Public Health Service needs, but it is believed that the underlying principle of this approach is broadly applicable.

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Children's Bureau Appointments

The appointment of Elizabeth Healy Ross, M.S.W., to the newly created post of deputy chief of the Children's Bureau and of Melvin Glasser, B.S.S., as special assistant for State and national organization relations on the bureau's juvenile delinquency project, was announced in September by the Federal Security Administrator.

Before coming to the Children's Bureau, Mrs. Ross, a psychiatric social worker, served as consultant to various Federal and District of Columbia agencies, including the National Institute of Mental Health. A member of both the American Association of Social Work and of the American Association of Psychiatric Social Workers, Mrs. Ross was elected a member of the executive committee of the National Conference of Social Work in 1951. She is a member also of the panel on Mental Health of the President's Commission on Health Needs of the Nation.

Mr. Glasser was executive director of the Midcentury White House Conference.

Four Health Education Evaluation Studies

Health education programs are more likely to be effective when objective measures are applied as the program is being developed in order to identify likely barriers to success. By discovering such barriers during the early stages of program development, necessary improvements can be made quickly and at minimum cost. These findings are reported in Public Health Monograph No. 8, "Pretesting and Evaluating Health Education."

The studies reported are: "Application of Pretesting in Health Education," by Andie L. Knutson, Ph.D.; "Pretesting a Nutrition Filmstrip," by Benjamin Shimberg, Ph.D.; "Evaluating a Nutrition Education Program," by Benjamin Shimberg, Ph.D., and Jane S. Harris, M.S.; and "Note on Exhibits as a Health Education Medium," by Mayhew Derryberry, Ph.D.

Approach to Pretesting

A systematic approach to pretesting is suggested by calling attention to several conditions necessary for effectiveness which must be satisfied. While satisfaction of these conditions will increase the likelihood of program success, it does not guarantee program success.

A distinction is drawn by Knutson between critical review of the planning process, evaluation studies of program effectiveness, and objective pretests to identify possible barriers to success. A variety of practical approaches are suggested for anyone who wishes to carry out pretests of educational programs or materials.

Nutrition Filmstrip

An application of the principles and methods of pretesting is illustrated in the development of an informational filmstrip about nonfat dry milk. Shimberg emphasizes the techniques and



Public Health MONOGRAPH 8

The accompanying summary covers the principal findings presented in Public Health Monograph No. 8, published concurrently with this issue of *Public Health Reports*. The authors are members of the staff of the Division of Public Health Education, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Knutson, Andie L., Shimberg, Benjamin, Harris, Jane S., and Derryberry, Mayhew: Pretesting and evaluating health education. Public Health Monograph No. 8 (Public Health Service Publication No. 212). U. S. Government Printing Office, Washington, 1952. Price 20 cents.

methodology selected to meet the specific problems posed by this filmstrip.

The behavioral pattern depicted in the film was checked to see whether it conformed with the pattern of living of the intended audience.

Tests to reduce reading difficulty and increase human interest were utilized. Personal interviews of a sample of the intended audience revealed where misunderstandings of the text and illustrations could be eliminated. A test copy of the final filmstrip determined its effectiveness in imparting information about nonfat dry milk to women attending a clinic.

Nutrition Education Program

Evaluation of a health education program in terms of behavior is described in a third paper by Shimberg and Harris. A follow-up study of an educational program about nonfat dry milk was carried out 2 months after the program was presented in a well-baby clinic. Answers to the following questions were obtained: Was the family milk consumption increased? Did the people begin using nonfat dry milk after this program? Did women acquire the information which the program attempted to teach? What attitudes did they have toward nonfat dry milk after the program?

Exhibits

A fourth paper by Derryberry considers these questions: How long will people look at a health exhibit? How much material can be included in an exhibit with some assurance that it will be read?

During the New York World's Fair, trained observers recorded the number of seconds visitors actually spent looking at each exhibit in the Hall of Medicine. Other observers read all the legends of each exhibit and recorded the length of time required to read them. Comparison of these two time-records revealed that as the length of time to read an exhibit increased, the relative amount of time spent on an exhibit decreased.

The findings suggest to exhibitors the need to limit the information they try to cover in an exhibit, if they expect the audience to read the message.

The first two papers in the series, which is continued in the monograph, were published in *Public Health Reports* last year, one in January and one in July.

Sources of Morbidity Statistics

Where do morbidity data come from? What are the gaps?—and what steps should be taken to fill them?

The Third Report of the WHO Expert Committee on Health Statistics presents, among other things, a panoramic review of morbidity statistics sources. Some 24 sources of morbidity data are classified by uses—disease control, program planning, research, etc.; by coverage in terms of population—whether all persons are included, a representative sample, or various types of non-representative samples; by the degree of coverage—whether all or only selected sicknesses are included, and whether disease is reported at a point in time or for a period of time; and by the type of country in which each source is applicable.

The committee recommended study of the sickness survey method as a means of obtaining morbidity data for the general population for health needs. It called for intensive study of means to determine the extent of illness in the general population from data covering selected or specialized populations. Each of the sources of such data—for example, hospital records—is a potential reservoir of public health statistics. The problem is to utilize existing data to obtain a picture of illness in the general population.

The committee made a series of recommendations—covering studies of methods for obtaining data, morbidity terms to be defined, methods of classifying and presenting morbidity data, computing morbidity rates, etc.—to serve as guideposts

for future study and possible action. One of its major recommendations was that “national agencies responsible for health or health statistics establish groups of experts in sampling theory, in the operation of field surveys, and in the analysis of morbidity data within their organization which can utilize survey methods in the investigation of the varied health problems with which such agencies are confronted and make the services of these experts available for consultation throughout the nation and for international purposes.”

Copies of the report may be obtained on request to the National Office of Vital Statistics, Public Health Service, Federal Security Agency, Washington 25, D. C.

Antimalarial Activity of 4,000 Compounds

More than 4,000 compounds were tested at the National Institutes of Health from 1941 to 1951 for antimalarial activity against *Plasmodium gallinaceum* and for toxicity to the chick. These and related data appear in Public Health Monograph No. 9, "A Survey of Antimalarial Compounds."

The report includes a detailed description of the tests employed for antimalarial activity, both suppressive and prophylactic, and the tests for subacute chronic toxicity to the chick. The compounds tested are arranged in chapters according to their presumably important chemical structure. Every chapter contains a series of tables, each of which summarizes the data on compounds in which usually only one part of the molecule has been varied. For each compound the results of the following tests are given: minimum effective therapeutic dose, minimum partially prophylactic and/or completely prophylactic dose, maximum and fully tolerated doses, and the therapeutic index. The salient points in the comparative data in the tables are brought out in the discussion portion of each chapter and an attempt is made to derive general conclusions and principles regarding chemical structure and biological activity.

Summary tables list compounds in order of their minimum effective therapeutic dose, therapeutic index, and prophylactic activity.

Appendixes list the more commonly employed salts of the compounds tested, the sources of the compounds, and a bibliography of publications by the authors and their colleagues dealing with compounds discussed in the monograph. The report is indexed by compound number, based on the numbers assigned by the Office of Scientific Research and Development, under which practically all antimalarial testing was carried on during World War II, and extended to include compounds received at the National Institutes of Health after the war. The index contains cross references to tables in which the compounds can be found, to publications in the bibliography, and to sources.



Public Health
MONOGRAPH 9

The accompanying summary covers the principal findings presented in in Public Health Monograph No. 9, published concurrently with this issue of *Public Health Reports*. The authors are members of the staffs of the Laboratory of Tropical Diseases, National Microbiological Institute, and the Laboratory of Chemistry, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health of the Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Radiation Exposure in the United States

By DADE W. MOELLER, M.S., JAMES G. TERRILL, JR., C.E., M.B.,
and SAMUEL C. INGRAHAM, II, M.D., M.P.H.

THE HUMAN RACE has always been exposed to some ionizing radiation of cosmic origin and from natural sources in the environment and within the body. During a lifetime, a person who lives to be 70 years of age is exposed, on the average, to about 9 roentgens of radiation from these sources. Today, however, radiation from these sources comprises only a small portion of the total exposure received by man. Radiation-generating machines and radioactive materials, which are being employed in nearly all phases of the environment, constitute the principal sources of radiation.

Knowledge of the wide variety of sources and of the levels of radiation exposure is essential to the planning and conducting of a sound radiological public health program. Data available in the literature on the extent of radiation exposures in the United States are reviewed here to aid the many State and local health departments engaged in determining and evaluating radiation sources affecting public health in their areas. Neither the control of radiation exposure nor specific public health effects of the exposure are discussed in this paper.

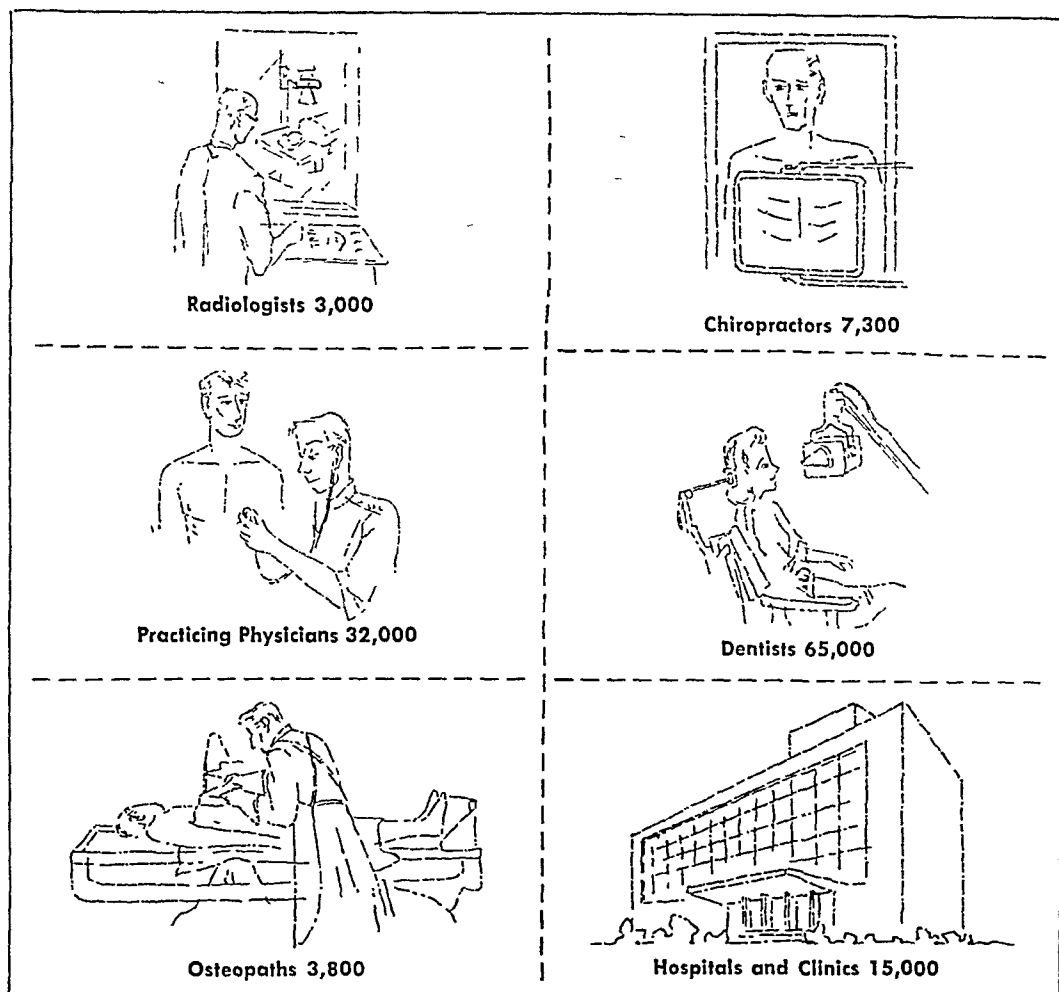
Mr. Moeller, a sanitary engineer, is an environmental radiation specialist with the radiological health branch, Division of Engineering Resources, Bureau of State Services, Public Health Service. Mr. Terrill is acting chief of the branch and chairman of the Committee on Radiological Health of the Engineering Section, American Public Health Association. Dr. Ingraham is assistant chief of the branch.

Medical and Dental Uses of X-ray

In the United States today, more than 125,000 X-ray units are being used for diagnosis and therapy—approximately 50,000 by general practitioners, physician specialists, radiologists, and in hospitals and clinics (1); 65,000 by dentists; and 11,000 by doctors of osteopathy and doctors of chiropractic.

In the operation of these X-ray units, more than 215,000 medical-technical personnel are potentially exposed to radiation. These personnel include about 3,000 radiologists devoting full time to their specialty, 500 physicians devoting most of their time to radiology, 600 physicians who are second- and third-year residents in radiology, 31,000 general practitioners and specialists owning their own equipment (1), 67,000 dentists, 11,000 osteopaths and chiropractors, 40,000 X-ray technicians, and probably close to 40,000 dental technicians and assistants. This listing undoubtedly omits many nurses, clerks, attendants, and technicians who are exposed to radiation in a lesser degree.

Although many instances of excessive exposure of X-ray personnel are reported in the literature, few specific data are available regarding average exposure for these workers. In a 3-week survey of personnel in doctors' and dentists' offices and X-ray departments, it was found that about 3 percent of the exposures exceeded the present-day maximum permissible dose of 0.3 roentgen per week. However, 81.5 percent were less than 0.05 roentgen per week (2). In a 9-month survey of personnel in X-ray departments only, about 0.4 percent of the exposures exceeded 0.3 roentgen per week,



X-ray units in the healing arts

with 97 percent being less than 0.05 roentgen per week (2).

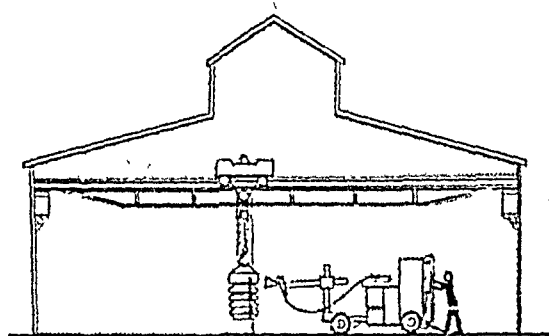
Exposures of X-ray personnel in Public Health Service hospitals range from 0 to 0.46 roentgen per 2-week period. An appreciable fraction of radiologists experience exposures averaging more than 0.1 roentgen per day. About 20 percent of the personnel operating photofluorographic equipment exceeded 0.3 roentgen per week prior to the start of a successful radiation control program.

Operators of dental X-ray machines receive approximately 0.1 roentgen of general body exposure per eight mouth examinations, each of which consists of ten 3-second exposures. This figure assumes careful operation of the unit. In conducting mass dental X-ray surveys, operators can easily receive the maximum permissible dose of radiation even with some rotation of operators. Persons in the immedi-

ate area of dental X-ray units can receive appreciable percentages of the maximum permissible dose.

In addition to the operators, a considerable portion of the general population is also exposed to radiations from X-ray machines. Of the 2,500,000 persons seen daily by physicians, a large number have some X-ray diagnostic procedure performed upon them by the physicians, and 82,000 are referred to radiologists. Approximately 25,000,000 X-ray examinations are given annually by radiologists (1). Data relative to radiation exposures resulting from these examinations are summarized below:

Type of examination	Average radiation dosage (roentgens)	Distribution (percent)
Radiographic.....	2.7	51.88
Photofluorographic.....	1.0	33.64
Fluoroscopic.....	65.0	14.48



Industrial X-ray installation

The radiation exposures range from approximately 1 roentgen for a photofluorographic examination to about 65 roentgens for an average fluoroscopic examination. Using the data in the above table and weighting each radiation dosage by its percentage distribution, an overall average radiation dose can be calculated. This average dose is 11 roentgens per examination.

X-ray treatments given annually by radiologists number more than 4,000,000 (1). These treatments are usually confined to a very small portion of the patient's body, and are usually administered at several sittings. The average total dosage per patient is about 5,000 to 7,000 roentgens.

Probably the largest single source of medical radiation exposure in the United States is the mass chest X-ray survey for tuberculosis. An estimated 15,000,000 persons were given chest X-rays in such surveys in 1950. Most of the X-rays given in the mass survey are the photo-fluorographic type, which results in about 1.0 roentgen exposure to the patient's chest per examination.

Some 84,000,000 films are used annually for dental X-ray examinations. In 1949, the 60 million persons (40 percent of the population) who visited their dentists were potentially exposed to radiation from this source. The average exposure to the patient per film is about 5 roentgens, most of the exposure being limited to the mouth of the patient.

X-ray in Industry

Industrial X-ray devices include primarily (a) radiographic and fluoroscopic units used for the determination of defects in castings, fabricated structures, and welds, and (b) fluo-

roscopic units used for the detection of foreign material in, for example, packaged foods. At present, there are approximately 800 industrial radiographic installations in the United States (8), and about 5,000 persons are potentially exposed to radiation in the use of the equipment. Industrial X-ray units, both radiographic and fluoroscopic, probably number about 2,000.

Exposure levels for personnel operating these machines depend upon the type of installation and the operating procedures used. Most permanent installations were designed and the personnel assignments planned so as to limit exposures to the levels recommended by the National Committee on Radiation Protection at the time the installation was built. However, the downward revision of the maximum permissible dose calls for a reevaluation of the older installations.

Fluoroscopy is also sometimes used for the scanning of personnel to detect pilfering. Exposures of 0.045 to 0.09 roentgen per inspection may be received by the "subject." The unit operator may receive 0.1 roentgen, largely limited to his head and shoulders, for each 50 persons inspected (4).

Other potential sources of X-ray exposure in industry are found in connection with the manufacture, testing, and operation of high-voltage electronic tubes. Personnel exposures may range as high as 2.5 roentgens per day.

Commercial Use of X-ray

The use of fluoroscopy in shoe-fitting results in radiation exposures to both operators of the fluoroscopes and the public. Mean exposures for the customer range from 7 to 14 roentgens per 20-second exposure. Although the radiation is intended only for the feet, dosages of 0.03 to 0.17 roentgen per 20-second exposure may be received by the pelvis. The number of exposures received by shoe customers is not known. In the operation of the approximately 10,000 fluoroscopes in the United States, 30,000 to 40,000 sales people are exposed to radiation.

X-ray in Research

With the development of atomic and nuclear physics, high-voltage X-ray machines have be-

come familiar features of research laboratories in universities and similar institutions. Few data are available as to the levels of exposure received by personnel in these radiation laboratories. Injuries have probably been held to a minimum by frequent turnover of personnel. However, in laboratories where cyclotrons, linear accelerators, and positive ion tubes, as well as high-voltage X-ray machines, are used, it is estimated that there is a frequency rate of "one palpable injury per 20 to 30 man-years of active employment in radiation work" (5).

Also in use for research purposes are about 1,500 X-ray diffraction units. Surveys of these units by the radiological health branch of the Public Health Service have recorded intensities of scattered radiation up to 1 roentgen per hour. Several cases of skin ulcers resulting from accidental overexposures in the use of these units have been reported.

Another X-ray unit found in many laboratories is the electron microscope. Approximately 500 are in use. Intensities of scattered radiation from these units may range up to 1.5 roentgens per hour.

Radioisotopes Distributed by AEC

More than 900 universities, hospitals, and research laboratories in 46 States have used or are using radioisotopes produced by the Atomic Energy Commission for medical, biological, industrial, agricultural, and scientific research, and medical diagnosis and treatment. During 1950 an average of 45 curies of radioactive isotopes were distributed per month. There are currently some 7,500 persons who are directly involved in the use of these materials. About 1 in 300 radioisotope users exceeds the present-day maximum permissible dose in a given week. Fifty to seventy-five percent receive less than 0.05 roentgen per week.

Patients to whom radioisotopes are administered internally may receive up to 10 or more roentgens whole-body exposure from diagnostic doses and 75 to 100 roentgens from therapeutic doses. Calculated dosages to single organs, such as the thyroid gland, range from 10,000 to 300,000 roentgens.

Radioisotopes are also used in medical therapy as external sources of radiation. Beta-ray

applicators are available for the treatment of certain eye conditions. Cobalt-60 is available in the form of large shielded concentrated sources for deep therapy and in the form of small needle sources for intracavitary and interstitial therapy.

Cobalt-60 is used industrially for radiography. About 80 sources are being used in the United States in industries such as railroading, steel production, boiler-making, automobile manufacture, ceramics production, pressure vessel manufacture, and the making of castings. The intensity of radiation from 1 curie of unshielded cobalt-60 at 1-foot distance is 14.4 roentgens per hour. The quantities used in industry range from 100 or 200 millicuries up to as high perhaps as 1 curie.

Thickness gauges using radioisotopes are becoming more and more popular in industry. More than 50 such gauges using strontium-90 and some 20 using other radioisotopes are presently in use in the United States. Surveys have shown that the external radiation to which personnel working around these units are exposed is well below the maximum permissible dose. Strontium-90 is also used to activate phosphors for use in luminous markers, which are hermetically sealed to prevent escape of the radioactive material.

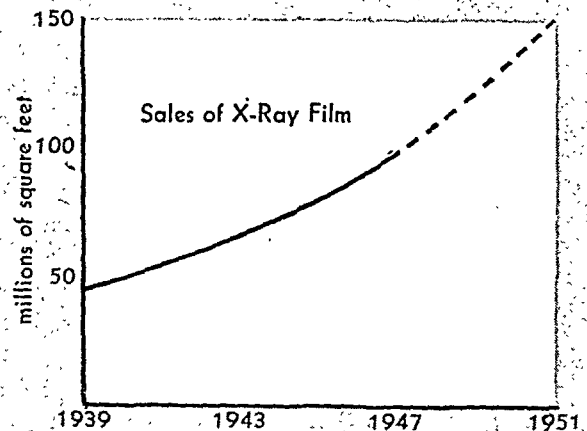
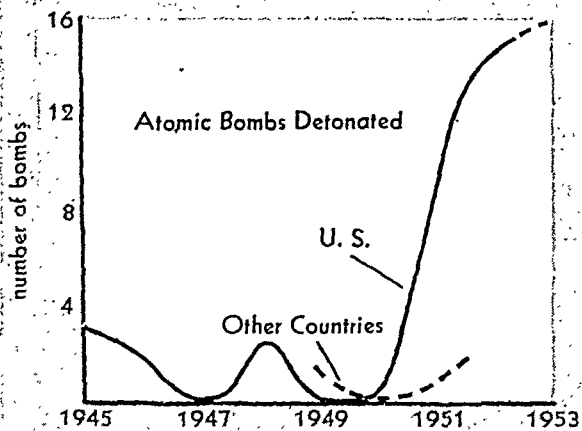
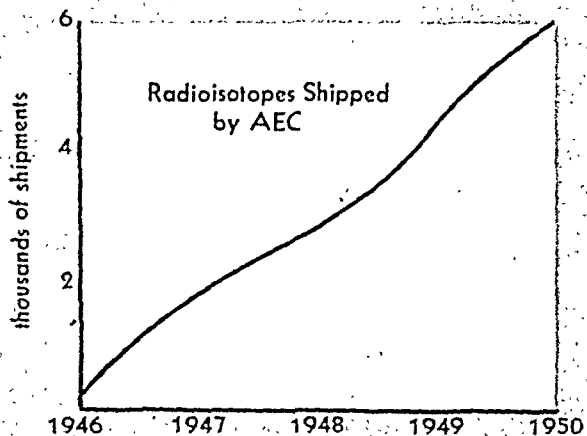
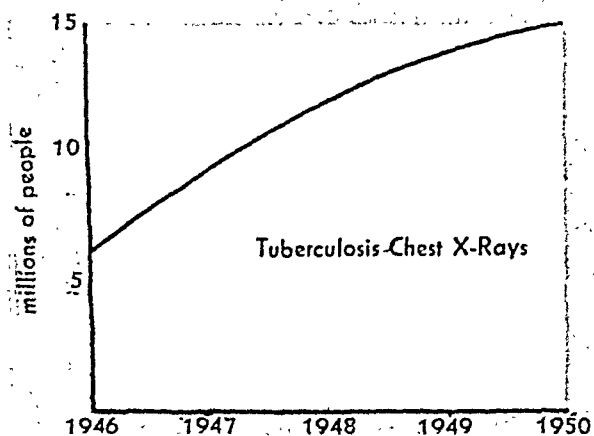
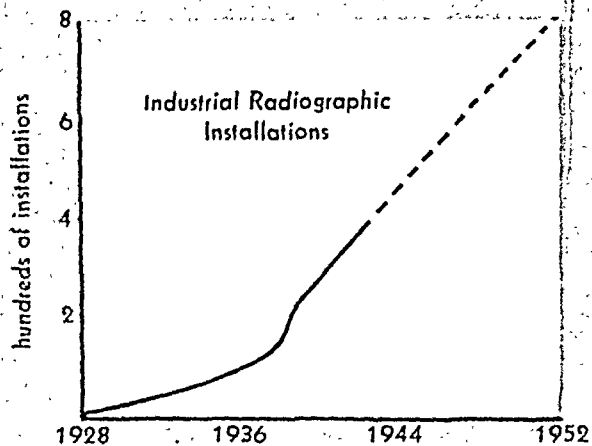
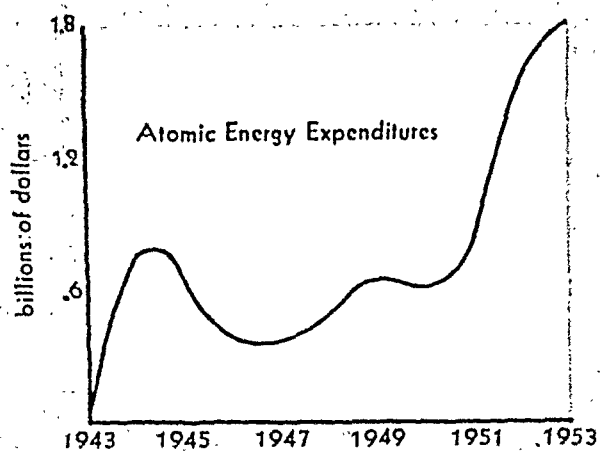
These and other radioisotopes are being widely used in a variety of industrial research problems.

Within the next few years, industrial uses of fission products are expected to become more widespread. Through 1950, however, only about 4 curies had been distributed by the Atomic Energy Commission.

Wastes from the use of radioisotopes in industry, the medical profession, and research laboratories could cause radiation exposure to persons outside the installations using the radioisotopes. Safe disposition procedures are well covered in official publications.

Radium

The radiation from 1 curie of radium, in equilibrium with its decay products and enclosed in 0.5 mm. of platinum will produce a gamma-ray exposure of about 9.0 roentgens per hour at a distance of 1 foot.



INCREASE OF RADIATION

Many individuals are potentially exposed to radiation in the medical use of radium. Patients receive radiation dosages comparable to those given in X-ray treatment. Nurses and other persons attending the patient are also exposed during the course of treatment. Technicians and therapists often receive high exposures since radium can seldom be applied accurately with remote handling devices. Local exposure to their hands often exceeds 1 roentgen per day. In the preparation and handling of radon applicators, these personnel may receive additional radiation exposures.

During World War II, radium was used extensively in the United States for industrial radiography, largely because X-ray units were difficult to obtain. As much as 100 grams were in use. In 1948, the amount had declined to 50 grams (6). At present, many of the radium radiographic installations have been replaced by X-ray machines and cobalt-60.

Radium sources are commercially available in 25-, 50-, 100-, 200-, 300-, and 500-milligram units. The 100- and 200-milligram units are most commonly used. Average exposures received by industrial personnel handling radium are not known.

Another industrial use of radium is in self-luminous paint. During World War II, several thousand workers were using this paint, and several hundred grams of radium were utilized. After the war, the number of workers decreased until in 1948 there were only about 300 (6). Although each worker handles only a small quantity of radium, the hazards are great since the radium is not sealed in a container and can therefore be ingested or inhaled.

Under present conditions, it is recommended (National Bureau of Standards Handbook 47) that the amount of radium-226 fixed in the body should not exceed 0.1 microgram. Fatalities have been known to occur when the amount was approximately 1 microgram. Under the best working conditions existing in 1943 in the radium-dial-painting industry, 15 percent of the workers accumulated more than the maximum permissible amount (7). In a recently reported survey at an instrument shop, a degree of radium contamination greatly in excess of the maximum permissible concentration was found.

It is generally accepted that the maximum permissible concentration for radon in the air is 10 micromicrocuries per liter (5). When workroom ventilation requirements are met, the radon concentration in the workroom air does not exceed 30 percent of the maximum permissible concentration. However, ventilation requirements are not always met, especially in storage and packing rooms and offices.

The normal gamma-radiation exposure received by dial-painting workers appears to be about 0.02 roentgen per day (5). Exposures to radiation may also occur in the use of finished products containing a luminous compound. A watch may have approximately 1 microgram of radium on it. Some clocks and aircraft instruments contain from 10 to 100 micrograms of radium. The level of exposure at the instrument panel in airplanes so equipped may be 0.01 roentgen per hour, and at the pilot's body position from 0.0002 to 0.001 roentgen per hour.

An important factor to be considered in determining radiation exposure in the United States is that radium and many other naturally radioactive materials may be purchased on the open market. No formal application or special facilities are required in order to obtain these materials.

Numerous instances of radium being lost have been reported, all constituting danger of unsuspected radiation exposure. Taft (8) has reported on 107 losses, with 59 complete recoveries, 11 partial recoveries, 36 total losses, and 1 not recorded.

Static Eliminators

Static eliminators containing radioactive sources are widely used in textile and paper trades, printing and photographic processing industries, and by telephone and telegraph companies. They are also used with analytical balances and microtomes.

One type consists of a bar containing a strip of metal impregnated with radium. A thin layer of gold and nickel is plated over the radium metal strip to protect the radium and act as a seal. The main hazards from this type result from exposure to beta and gamma radiation (alpha constitutes little external hazard) and radon gas.

Exposure levels in the working areas near these units are generally about 0.005 roentgen per hour but may range up to 0.085 roentgen per hour. Unless care is exercised and the necessary shields used, maintenance men and other workers whose duties require them to be close to such units frequently can be exposed to radiation levels as high as 1 roentgen per hour.

The radon hazard is small if the units are given proper care and used in ventilated areas. However, if the seal is broken, a radon hazard may result. Several surveys have pointed out that improper storage and handling of static eliminators is common.

A second type of static eliminator contains polonium as the radioactive source. This unit constitutes little external radiation hazard since the alpha particles from polonium travel only a short distance in air. The hazards associated with its use result from ingesting, absorbing, or inhaling polonium liberated through breaking or flaking of the gold seal.

Small polonium bars are also mounted on brushes as static charge eliminators for phonograph records and photographic films.

A point about polonium that must be given careful consideration in certain applications is that polonium volatilizes at lower temperatures than radium.

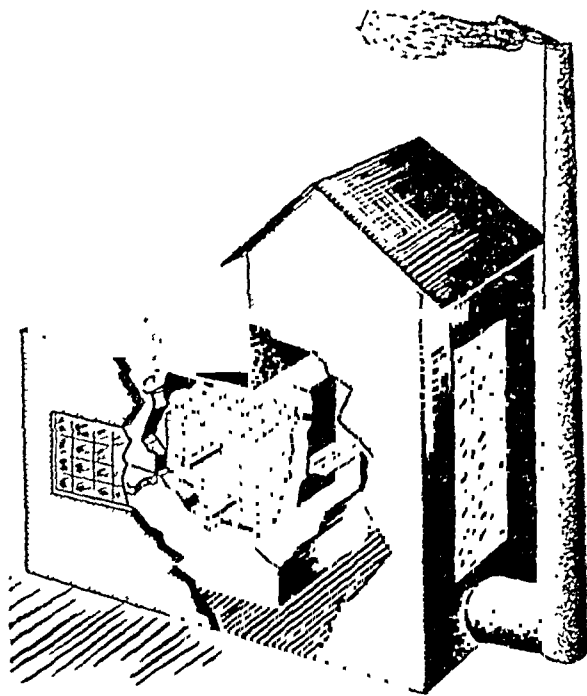
Shipping of Radioactive Materials

Radiation exposures can occur during the handling and shipping of radioactive materials. Under the current regulations governing the shipment of these materials by air, the maximum exposure which an airplane crew member or passenger could receive would be 0.012 roentgen per hour. The maximum exposure for pilots (flying 85 hours per month) would therefore be 1.02 roentgens per month (9).

Nuclear Reactors

Radiation exposures associated with the operation of nuclear reactors include those from the reactor itself, from its ventilation and cooling effluents, and from its fission products.

Data on the "water boiler" type reactor being built at the North Carolina State College serves as a tentative guide in establishing the



Enriched-uranium, graphite-moderated reactor

importance of such installations as sources of radiation exposure (10).

A maximum of some 10^5 curies of activity will be present in the fuel solution of this reactor. Heavy shielding will be required to limit all radiation exposure from the reactor and its accessories to a safe level.

At maximum operating level, 10 kilowatts, the reactor will require 3 gallons of water per minute for cooling. Upon leaving the reactor, the water will contain some 1,000 disintegrations per second per cubic centimeter. Assuming no shielding and no internal absorption of radiation by the water, 10 gallons of freshly irradiated water would produce a radiation dosage rate of approximately 0.08 roentgen per 8 hours at a distance of 5 feet. After 1 hour, the dosage rate would drop to about 0.0008 roentgen per 8 hours at a distance of 5 feet. Tanks for collecting and retaining this waste water for 10 hours will be provided.

Some 40 liters per hour of waste gases will be produced at 5 kilowatts normal operating level. The activity of these gases will amount initially to about 7,000 curies per kilowatt minute. After 4 hours, however, this 7,000 curies will have decayed to 0.15 curie.

Solid as well as other liquid and gaseous wastes will result if laboratory or experimental

programs are conducted in conjunction with operation of the reactor, or if the used nuclear fuels are reprocessed.

A second type of nuclear reactor, an enriched-uranium, graphite-moderated reactor, is being built for industrial research. It will be operated at a maximum power level of 200 kilowatts. Shielding, weighing a total of 450 tons, will be provided by 6 inches of steel and about 3 feet of "heavy" concrete. Data as to the wastes from operation of this reactor and the possible resulting radiation exposures have not been released.

Undoubtedly, other reactors will soon be built at other colleges and universities and in industry. At least five major universities have expressed interest in following the steps of North Carolina State College.

Particle Accelerators

In 1941, there were only some 16 cyclotron laboratories in the United States. Today, however, more than 100 particle accelerator units, including cyclotrons, synchrotrons, van de Graaff generators, and betatrons, are in use.

Exact determination of the type and intensity of radiation encountered around particle accelerators is often difficult and sometimes impossible because of the mixture of radiations present. Beta radiation originates from the various accelerators, but the possibility of direct exposure is slight. Neutrons probably constitute one of the main hazards, as they are produced in profusion in the operation of cyclotrons and synchrotrons.

Impaired vision of several nuclear physicists as a result of work with cyclotrons was reported

recently. The general injury rate for laboratory radiation workers was discussed above under X-ray in Research.

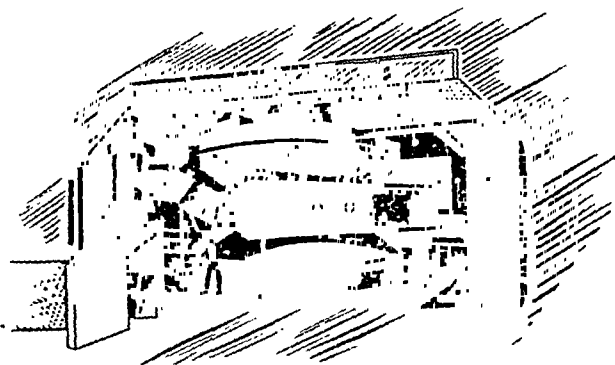
AEC Activities

Activities sponsored by the Atomic Energy Commission which result in radiation exposure include uranium mining and milling, nuclear reactor operations, and testing of weapons.

Uranium mining and milling in this country is carried on primarily in the region of the Colorado Plateau. Some 2,000 miners and millers are engaged in this work. The mining and processing of the ores and metals yields dusts and fumes which are sources of radioactive air pollutants. Radon gas is also a hazard. The Public Health Service and several State health agencies, which are active in studies of the specific hazards in this industry, have reported finding radon exposures above the maximum permissible concentration in several of the mines. In these instances, control measures, particularly ventilation, are being applied as rapidly as possible. Detailed physical examinations of over 1,100 workers have revealed no evidence of health damage from radioactivity.

Atomic Energy Commission installations conducting nuclear reactor operations are located in many areas of the United States. The radius of the potential health hazards of these operations may be increased by the discharge of radioactive liquid and gaseous wastes. For example, the installation at Oak Ridge, Tenn., discharges up to 5 curies per day of liquid wastes to the White Oak Creek. The potential risks are by no means always confined to those directly associated with such activities. For these reasons, an effective radiation control program has been an integral part of atomic energy operations since their inception.

In 1951, 12 bombs were detonated at the AEC Proving Ground in Nevada. The activity 1 hour after detonation of a nominal atomic bomb is approximately 10^9 curies. One week later, about 10^7 curies remain. Fortunately the majority of this radiation probably remains in the upper atmosphere, but some of it is widely distributed causing a temporary average increase in radioactivity throughout the United States.



The 184-inch Berkeley synchrocyclotron

Accidents

Numerous instances of radiation injury from accidents have been recorded in the literature. Moreover, it is believed that these represent only a small fraction of the accidents which occur. Any radiation exposure resulting from accidents would be in addition to the exposures discussed here. Obviously, the potential amount of exposure and the probable severity of injury incurred in an accident would vary with the amount of radiation involved.

Summary and Conclusions

A review of the literature reveals that the average annual radiation exposure from medical diagnostic procedures is about 2 roentgens per person. This exposure is received by a large portion of the population. Other medical sources of exposure are dental X-rays and medical radiation treatments.

Many segments of the population receive additional exposures as a result of contact with radioactive materials and radiation-generating units in commerce, industry, and research.

From the data presented, it is not possible to reach definitive conclusions as to the magnitude of the radiological health problem or as to the relative importance to public health of the several sources of ionizing radiation. It is hoped, however, that publication of this paper will encourage further studies which will lead to more conclusive data.

This review, meanwhile, indicates that large numbers of the population are currently exposed to radiation appreciably in excess of natural background. Such exposure often approaches doses recommended as the maximum permissible for radiation workers. The sources of these exposures vary from community to community, and their relative health importance is continually changing.

A tremendous national effort is being made by military and civilian agencies to expand the production and use of radioactive materials. It is expected that the near future will bring nuclear reactors for power production, research, and transportation into widespread use. Many radiological health workers believe that as this technological development occurs pro-

tection from radiation must become a major concern of public health programs. The time to organize and train to meet the radiological health responsibility of the future is at hand. The ability of health workers to cope with public health problems arising from the increasing hazard of ionizing radiation will be more readily developed if they learn to search out and to deal with the radiological health problems of today.

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Chemical Labeling Committee Reactivated

THE INTRODUCTION within recent years of a multitude of new chemicals and the increasing commercial application of chemical products have intensified the need for proper precautionary labeling. The use of adequate warning designations on containers of chemical products is essential in protecting the health of not only those who handle these materials in their various repackaging and processing stages but also of the ultimate consumers.

To reappraise current needs and to take new steps to meet today's problems, the Public Health Service is reactivating the work of the Chemical Products Agreements Committee, which had functioned prior to 1950. The new committee, to be known as the Chemical Products Labeling Committee, will serve in an advisory capacity to the Labels and Precautionary Information Committee of the Manufacturing Chemists' Association and to other agencies, such as State health and labor departments. The Public Health Service will provide a focal point in the Federal Security Agency for obtaining expert opinion on the need for labeling as well as for developing base lines for uniform labeling practices.

In recent years, practically every State health department and many labor departments have become interested in the labeling of toxic materials, and the resultant development of varying labeling requirements throughout the country has made it difficult for industry to cooperate.

In the interest of promoting uniform labeling, an effort will be made by the Chemical Products Labeling Committee to unite the activities of the various groups interested in this problem, to encourage better labeling practices throughout industry, and to assist in the development of improved labels.

The forerunner of this committee, in cooperation with the Manufacturing Chemists' Association, had been concerned with the develop-

ment and administration of specific agreements between the Surgeon General and certain chemical manufacturers, covering warning designations to be used on containers. Drawn up in the early 1930's, these agreements with manufacturers of methanol, carbon tetrachloride and other chlorinated hydrocarbons, carbon disulfide, aniline, benzene, and chlorinated naphthalenes, diphenyls, and diphenyl oxides were self-limiting because they were designed for specific conditions. These agreements have now been discontinued by the Public Health Service as part of its efforts to foster broader labeling practices better adapted to present conditions.

The products specified in the agreements that have now been abrogated, as well as all other potentially hazardous chemicals, are covered by a label pattern developed by the Labels and Precautionary Information Committee of the Manufacturing Chemists' Association, with the concurrence of the Public Health Service. Such a pattern is believed to afford a more feasible approach to the problem presented by the tremendous expansion of the chemical industry.

Surgeon General Leonard A. Scheele, commending the work of the Labels and Precautionary Information Committee, indicated that the Public Health Service endorses the principles of labeling as set forth in part I of Manual L-1, Warning Labels, published by the Manufacturing Chemists' Association. He stressed that the identification of potentially hazardous materials through proper and uniform labels is vital to the public health.

This labeling program has been developed for bulk packages of chemicals intended for commercial use and in no way affects the provisions of the Federal Caustic Poison Act, which applies to some caustic and corrosive chemicals intended for household use, or of the Federal Food, Drug, and Cosmetic Act, which requires adequate warnings on the labels of all drugs.

Members appointed by the Surgeon General to the Chemical Products Labeling Committee represent a cross section of Public Health Service activities related to this problem. Joseph E. Flanagan, Jr., assistant chief, Division of Occupational Health, will serve as chairman of the committee; members will be Dr. Samuel W. Simmons, chief of the technical development branch, Communicable Disease Center; Frederick S. Kent, chief of the home

accident prevention unit, Division of Sanitation; Dr. Donald J. Birmingham, chief of the clinical investigations section and of the dermatology unit, Division of Occupational Health; Dr. Herbert E. Stokinger, chief toxicologist, Division of Occupational Health. The Manufacturing Chemists' Association has appointed as a representative on this committee the chairman of its Labels and Precautionary Information Committee.

Diphtheria in the United States

The incidence of diphtheria in the United States has shown a steady decline during the past few decades. From a 3-year average rate of 60.3 cases per 100,000 population for 1929-31, the rate dropped to an average of 3.9 for the period of 1949-51. It is estimated by the National Office of Vital Statistics that 3,200 cases of diphtheria will be reported in 1952, which would be a morbidity rate of about 2 cases per 100,000 population for the year.

During the last 2 decades decreases have occurred in diphtheria incidence rates for each of the geographic divisions, but these decreases, as shown in the chart, have

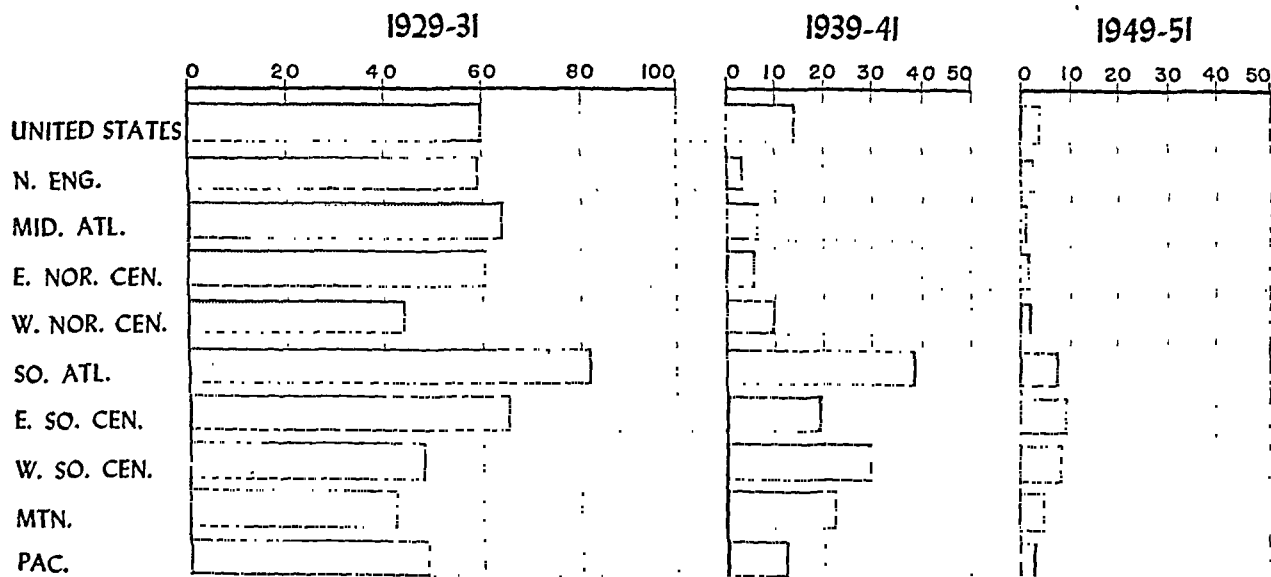
not been of the same magnitude in each division. The highest rate (82.8) in 1929-31 was in the South Atlantic division. In 1949-51 the high incidence has shifted farther south and the rate of 8.9 in the East South Central division was the highest. On the basis of data available in November 1952, it is estimated that the rates in 1952 in the various geographic regions will be approximately as follows: New England 0.5 cases per 100,000 population, Middle Atlantic 0.9, East North Central 0.7, West North Central 1.4, South Atlantic 4.3, East South Central 5.6, West South Central 4.1, Mountain 1.6, and

Pacific 1.3. In each instance this represents a substantial decrease as compared with average rates for the 1949-51 period.

Comparison of the percentage of the total cases occurring in the various areas also shows the shift in incidence from northern to southern States. For the period 1929-31, 34 percent of the cases in the United States were reported in the three southern divisions; Middle Atlantic, East South Central, and West South Central. During 1949-51, 64 percent occurred in these areas and in 1952 the proportion is still greater, namely 68 percent.

DIPHTHERIA BY GEOGRAPHIC DIVISIONS

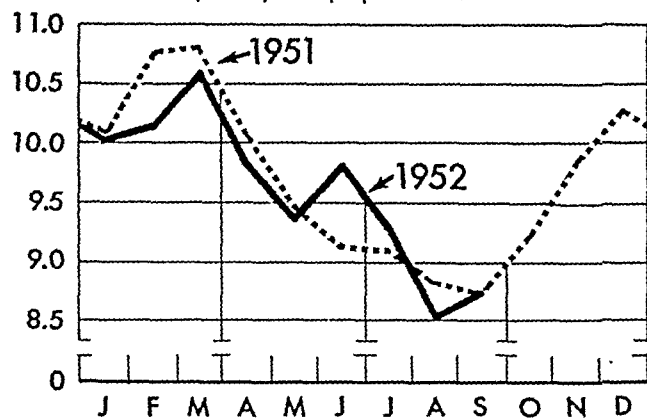
(AVERAGE MORBIDITY RATES PER 100,000 POPULATION)



Estimated population July 1, 1930, 1940, and 1950.

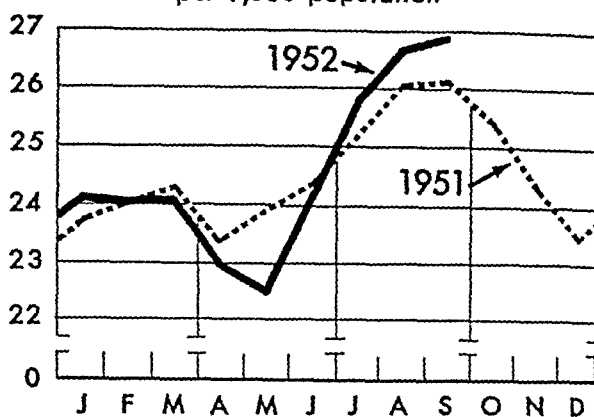
Deaths

per 1,000 population



Births

per 1,000 population



United States Vital Statistics, 1951-1952

A new high for births and a continuing low level for deaths appear very likely for 1952 (table 1). Thus the natural increase in the population of the United States—that is, births minus deaths—should be greater than for any previous year. Marriages in 1952 continued to drop from the all-time high reached in 1946. On the basis of data from 19 States, divorces, which have also dropped off since their 1946 peak, appear to be rising slightly in 1952. These statements are based on provisional figures for States shown in the *Monthly Vital Statistics Report* for January–September 1952. Each month the figures are sent by State and local officials to the National Office of Vital Statistics.

Deaths

Mortality statistics for the United States show that for the last 4 years, 1948–51, less than 10 people out of every 1,000 died during the year. For the first 9 months of 1952 the death rate was 9.6 deaths per 1,000 population, indicating that 1952 is likely to rank along with 1950 in having the lowest death rate on record.

For the past 15 years, 1937–51, the infant mortality rate (deaths under 1 year of age per

1,000 live births adjusted for changing numbers of births) for each year has been lower than that for the preceding year. For the period January–September 1952, the infant mortality rate was 28.3, so that 1952 may prove to be no exception to this trend of ever lower annual rates.

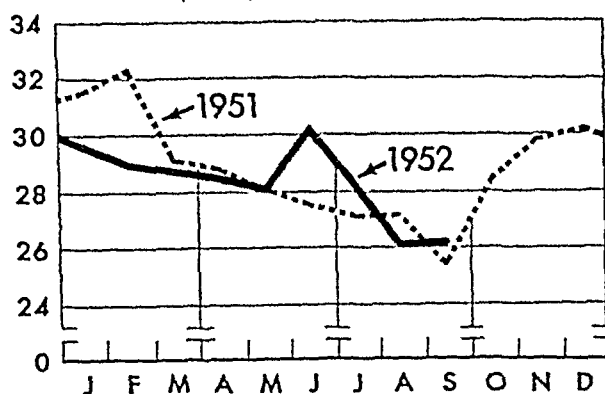
The summer of 1952 was noteworthy for long spells of record-breaking hot days in many parts of the country. That the heat wave had some effect on mortality is evident in two of the accompanying charts. Generally, in its seasonal variation the death rate decreases from May to June. Last year the death rate swung upward from 9.4 deaths per 1,000 population for May to 9.8 for June, the highest rate for June since 1944. The infant mortality rate rose from 28.2 infant deaths per 1,000 live births for May to 30.2 for June, contrary to its usual downward seasonal swing. Unusual increases were noted in the death rates for diseases of the cardiovascular system, for accidents, for homicide, and for some gastrointestinal diseases.

Table 2 gives the estimated death rates for selected causes in the United States during the first 9 months of 1951 and of 1952. The relative timeliness of information on causes of death is made possible through the cooperation of the States in sampling their death records monthly. The State vital statistics offices send to the national office every tenth death certificate, which

Prepared by the National Office of Vital Statistics, Public Health Service.

Infant mortality

per 1,000 live births



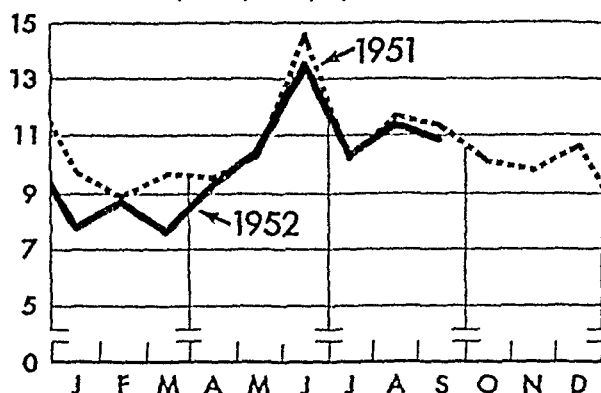
is processed immediately. However, this early information is less accurate than the complete data that will be available when all the death certificates are received. A discussion of the amount of error to be expected as a result of sampling variation is presented in the *Monthly Vital Statistics Report*.

Births

In 1951 and the first 9 months of 1952 the number of births exceeded records set in 1947. For January–September it is estimated that 2,856,000 births were registered in 1952 as compared with 2,811,000 in 1951 (table 1). The number recorded during all of 1951 (3,758,000) was in turn almost 2 percent above the 1947 figure of 3,699,940 (final). In the years between these high points, the annual number of registered births held consistently at 3½ million.

Marriage licenses

per 1,000 population



The total number of births is slightly larger than the number registered because of the failure to register some births. It is estimated that 3,833,000 children were born in 1951 as compared with 3,817,000 in 1947.

The crude birth rate serves to indicate what proportion births bear to the current population of all ages. In a period of rapidly increasing population, as at present, this proportion may decline despite a rise in the number of births. Thus, the crude birth rate based on registered births was 24.5 per 1,000 population in 1951 and 25.8 in 1947. Between 1950 and 1951, a period in which the number of births rose sharply, the rate also increased (from 23.5 to 24.5). The slightly higher number of births in the first 9 months of 1952 as compared with 1951 caused no change in the birth rate, which was 24.6 for both periods.

Table 1. Vital statistics: United States, January–September, 1951 and 1952

	Number			Rate		
	1952	1951	Percent change	1952	1951	Percent change
Live births:						
Registered.....	2,856,000	2,811,000	+1.6	24.6	24.6	0
Corrected for under-registration.....	2,905,000	2,867,000	+1.3	25.0	25.1	-0.4
Marriage licenses.....	1,161,840	1,223,951	-5.1	10.0	10.7	-6.5
Deaths.....	1,114,000	1,106,000	+0.7	9.6	9.7	-1.0
Infant deaths.....	80,500	79,400	+1.4	28.3	28.6	-1.0

NOTE: Deaths exclusive of fetal deaths and of deaths among armed forces overseas. Birth, death, and infant death data estimated. Birth, death, and marriage license rates per 1,000 population excluding armed forces overseas; infant mortality rates per 1,000 live births and adjusted for changing numbers of births. All rates on an annual basis. Population estimates prepared by the Bureau of the Census.

The recent upsurge in births began early in 1951 with peak increases over 1950 occurring in the months March through June. In the latter half of 1951, the birth rate each month exceeded that for the corresponding month of 1950, but by a smaller margin. The chart com-

Table 2. Estimated death rates for selected causes of death: United States, January-September, 1951 and 1952

[Exclusive of fetal deaths and of deaths among armed forces overseas; rates on an annual basis per 100,000 estimated population, excluding armed forces overseas]

Cause of death	Death rate, January- September	
	1952	1951
All causes.....	958.9	966.6
Tuberculosis, all forms.....	17.3	20.3
Syphilis and its sequelae.....	3.7	4.6
Dysentery, all forms.....	.6	.7
Diphtheria.....	.1	.2
Whooping cough.....	.3	.7
Meningococcal infections.....	1.0	.7
Acute poliomyelitis.....	1.9	.7
Measles.....	.4	.7
All other infective and parasitic diseases.....	3.3	2.9
Malignant neoplasms, etc. (principally cancer).....	142.7	141.6
Diabetes mellitus.....	16.2	16.4
Major cardiovascular-renal diseases.....	507.5	511.7
Diseases of cardiovascular system.....	493.8	496.3
Vascular lesions of central nervous system.....	108.5	104.6
Rheumatic fever.....	1.0	1.1
Diseases of heart.....	350.6	355.5
Hypertension without mention of heart and general arteriosclerosis.....	28.3	30.2
Other diseases of circulatory system.....	5.4	4.8
Chronic nephritis, etc.....	13.7	15.4
Influenza and pneumonia, etc.....	31.3	32.7
Ulcer of stomach and duodenum.....	5.6	5.4
Gastritis, duodenitis, enteritis, etc.....	5.4	5.1
Cirrhosis of liver.....	9.8	10.0
Acute nephritis, etc.....	1.8	2.1
Complications of pregnancy, etc.....	1.6	1.8
Congenital malformations.....	12.1	11.8
Senility, etc., and ill-defined conditions.....	15.2	16.7
Motor-vehicle accidents.....	22.2	21.1
All other accidents.....	38.9	38.9
Suicide.....	10.0	10.5
Homicide.....	4.8	4.5
All other causes.....	105.0	104.5

NOTE: Figures are based on a 10-percent sample of death certificates. The sampling error varies with the size of the death rate. For example, the estimate for diseases of heart is subject to an error of 0.5 percent, and for syphilis, 4 percent. Diphtheria, with a rate of only 0.2, is subject to an error of 22 percent.

paring monthly rates for 1951 and 1952 through September indicates that the main increases in 1952 occurred in July through September.

Part of the over-all increase in births in 1951 and 1952 was undoubtedly due to greater numbers of first-order births resulting from the sharp rise in marriages soon after the outbreak of hostilities in Korea. However, it is likely that increased numbers of higher-order births in these years also contributed to the gain.

Marriages

Monthly marriage license rates for the United States in 1951 and in 1952 through September (fourth chart) reveal a fairly similar seasonal pattern. Fewer marriage licenses are issued during the winter months than in the spring and summer, and June is the most popular month for obtaining marriage licenses.

In the past, marriage licenses have been responsive to such factors as the demobilization following the last war, the outbreak of hostilities in Korea, and the varying dates of Easter. The low birth rates during the business depression of the early 1930's, with the consequent reduction in numbers of young persons reaching marrying age during the current period, are now adversely affecting the number of marriages.

Because marriages by month on a current basis are not obtainable for the United States, the National Office of Vital Statistics publishes data on marriage licenses, rather than marriages, for most States. On an annual basis, the number of marriages is 1 to 3 percent less than the number of marriage licenses. Monthly figures on marriage licenses start with data for 1944, and annual figures on marriages go back to 1867.

Figures on marriage licenses for city areas that have populations of 100,000 or more are available by month starting with 1939.

Divorces

Current monthly figures on divorces for 19 States are published in the *Monthly Vital Statistics Report*. A somewhat larger group of States will be represented in the 1953 issues of this report. Annual estimates on divorces in the United States are available from 1867 through 1951.

Birth Statistics in Maternal and Child Health Programs

By WILLIAM HAENSZEL, M.A.

MANY convincing reasons can be advanced for processing all data from birth certificates as a single integrated operation. The data cannot, for example, be segregated into two watertight compartments—legal and medical. Such items as race, place of delivery, and previous child-bearing history of the mother are all part of the legal certificate, which is handled by the bureau of vital statistics, but they must also be taken into account in tabulating and interpreting the medical data, which in some places is handled by maternal and child health personnel. Processing a single punch card eliminates some duplication of work and simplifies scheduling of coding, punching, and tabulating procedures. Furthermore, the bureau of vital statistics is best equipped to conduct follow-up inquiries to complete information and routinely match infant death certificates with birth records. Desired birth tabulations can be furnished to maternal and child health administrators.

This paper deals primarily with problems of collection and analysis of material usually found on the medical supplement of the birth certificate, including data on fetal and neonatal

deaths. Recapitulating and summarizing developments in this field since 1940 has been greatly simplified by activities undertaken by the Public Health Conference on Records and Statistics, the Association of Maternal and Child Health and Crippled Children Directors, the National Office of Vital Statistics, and the Children's Bureau. Where opinion has crystallized, these organizations have made recommendations on definitions and tabulations for birth weight and related characteristics (1, 2).

Definitions and Grouping of Items

The need for and importance of standard definitions and procedures cannot be overemphasized. Comparisons—between hospitals and local areas within the State as well as on the interstate and international levels—are the heart of this enterprise. Each maternal and child health administrator has a stake in having tabulations for his jurisdiction which can be compared with experience elsewhere.

For death certificate terminology, there is the standard medical certification form and the elaborate machinery of the International Statistical Classification of Diseases, Injuries, and Causes of Death, and ancillary instruction manuals. For birth certificates, the phrasing and presentation of certain medical supplement items is still under study. The International List is not completely suitable for classifying complications of pregnancy and labor or operative procedures.

Lack of standard groupings for birth weights has been a deterrent to interarea comparisons of the proportion of immature births and

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weight-specific mortality rates. The distribution curves according to birth weight for live births and neonatal deaths exhibit steep gradients, at the smaller weights particularly. Differences of only a few ounces in class limits render the data virtually incomparable.

A detailed grouping of birth weights in intervals of 250 grams, with corresponding avoirdupois weights, has been published (1). The intervals have been so arranged that one division point, 2,500 grams ($5\frac{1}{2}$ pounds), coincides with the weight criterion for an immature birth in the International Statistical Classification.

The importance of hospitals following standard procedures for recording birth weight is obvious (1). They should report in the units of measurement appearing on their scales (metric or avoirdupois) and not attempt to convert birth weights. Failure to report birth weight on the birth certificate for even a small proportion of births can distort data on incidence of immaturity and mortality in low weight groups. The residual group of unweighed babies will consist almost entirely of immature infants, because of the tendency to leave very small babies unweighed, and can be sizeable in relation to the number of babies actually reported in the smaller weight groups. Routine checks should be maintained on the completeness of birth weight reporting for individual hospitals.

Length of pregnancy is used principally for the adjustment and distribution of unknown or not stated birth weights. Improvement in reporting on this item will eventually make possible the joint use of birth weight and gestational age data for indicating maturity of the newborn child.

Tabulations for individual hospitals should refer to the hospital where delivery occurred, unless clearly specified otherwise. This is important in areas maintaining special premature nursery facilities, to which babies are transferred from other hospitals. Separate tabulations will usually be maintained for "transferred babies."

Pregnancy and Labor

The International Statistical Classification cannot be considered an entirely suitable frame-

work for classifying complications of pregnancy and labor. To date classifications have been constructed from terms actually reported on the birth certificate. Complications fall into three major groups—labor, pregnancy, and nonpuerperal. It is not difficult to develop a list of titles within each of these groups. Trouble arises when specific terms are collected under each title. Such categories as "dystocia" or "disproportion of fetus" can cover a wide variety of conditions. Differences in incidence and mortality for certain complications can often be traced to noncomparability in conditions covered. In the absence of a standard classification system, it is of great importance that the kinds of complications under each title be clearly specified in publications (preferably in an appended glossary of inclusions).

An investigation of hospital records for a birth certificate sample in upstate New York revealed extensive under-reporting of complications (3). Reporting was more complete for deliveries involving fetal or neonatal death, or cesarean sections. Under-reporting could be confirmed anywhere by tabulating the proportion of certificates with reported complications by hospital. In Connecticut (1948) this proportion ranged from 3.3 to 26.3 percent for individual hospitals (4); reporting was better in the larger hospitals with well-organized obstetrical departments.

A check-list format for the medical supplement has been recently introduced in New York State and, according to a preliminary study, increased the incidence of total complications reported from 14.4 to 17.3 per 100 births (5). Anemia, premature separation of placenta, postpartum hemorrhage, breech and other malpresentations, heart disease, and syphilis were among the complications for which better reporting was noticeable. The design of the medical supplement should call attention to reporting of operative indications as complications or physicians may omit reporting complications obviated by resort to surgery (4).

Comparison of unpublished data collected by the Connecticut and New York State Departments of Health has revealed close correspondence in rates for certain complications for which there was substantive agreement in conditions covered. The two areas resemble each other

closely in many vital statistics indexes, and these comparisons enhance the confidence to be placed in the stability of the data. They indicate that the birth registration system can deliver descriptive results, even though subject to some distorting biases.

The code for delivery procedures in the International Statistical Classification needs some modification. No serious objection can be raised to the grouping of mid and high forceps, in view of their infrequency and the difficulty of distinguishing between them from birth certificate reports. However, the combination of breech extraction and of version and extraction under "manipulation without instruments" seems unwise. The two procedures have different characteristics when analyzed with respect to complications and mortality.

Connecticut data have demonstrated marked disparity between hospitals in the proportion of low-forceps deliveries, which could be traced to disagreement as to whether terminal or prophylactic forceps constituted an operative procedure and were to be so reported on the birth certificate (4). Current Connecticut practice has been to code prophylactic forceps as low forceps. There is no pressing need to distinguish between low-forceps and spontaneous deliveries. In many areas, mortality rates (both fetal and neonatal) have been reported without exception as lower for low-forceps deliveries. This held true even when the rates were adjusted in Connecticut to take account of the smaller birth weights among babies delivered spontaneously (4).

The check-list approach, discussed for complications, could readily be extended to cover delivery procedures.

Malformations and Birth Injuries

The Sixth International List provides a suitable scheme for classifying congenital malformations. The classification for birth injuries appears unduly condensed, segregating only intracranial and spinal injuries from other birth injuries. Separate categories for fractures, facial paralysis, and brachial plexus injuries could be provided.

Congenital malformations and birth injuries are not always apparent when the birth certificate is made out. Consequently, reporting on

the medical supplement must be regarded as incomplete. The degree of under-reporting can be approximated by comparing neonatal death certificates mentioning malformations or birth injuries with the corresponding birth certificate. Reporting of birth injuries is definitely poorer than for congenital malformations, only one-third of the birth injuries having been reported, according to the New York State data (6).

Neonatal deaths

A neonatal death is defined as one occurring less than 28 days subsequent to birth. The following groupings of ages of death (1) should suffice for most purposes: under 1 hour; 1 to 23 hours; single days to the end of the first week; 7 to 13 days; 14 to 20 days; 21 to 27 days.

Causes of death may be grouped for tabular presentation. Reference 2 gives a list of 45 selected causes.

Handling Neonatal Death Data

Three specialized procedures necessary for the handling of birth and neonatal death data deserve comment.

1. Matching birth and death records is without doubt the most important single step to be taken in the development of adequate birth statistics. Provisions for matching should always include neonatal deaths and, if possible, deaths under one year of age.

2. Combining data from matching birth and death records on a single punch card is a prerequisite for the efficient handling of neonatal death tabulations. At least the following information should be available (1):

From the birth certificate: Certificate number; place of birth, including identity of hospital; place of residence; attendant; sex; plurality; month and year of birth; race; age of mother; order of birth; birth weight; length of pregnancy; and any other medical and health items that are usually punched.

From the death certificate: Certificate number; age at death; cause of death; place of death.

3. Adjustments to take account of the "not stated" birth weights are necessary. Reports of birth weight are more likely to be omitted for grossly underweight babies, including those

Table 1. Weight-specific neonatal death rates per 100 live births, New York City, 1949

Birth weight		White		Nonwhite	
		For known birth weights	Adjusted for unreported birth weights	For known birth weights	Adjusted for unreported birth weights
Total-----		1.5	1.8	2.2	2.8
<i>Grams</i>	<i>Pounds</i>				
Under 2,500-----	5 pounds 8 ounces or less-----	11.7	14.1	11.2	14.4
2,500 and over-----	Over 5 pounds 8 ounces-----	.6	.7	.9	1.0
Under 1,000-----	2 pounds 3 ounces or less-----	93.4	97.4	82.4	88.5
1,000 to 1,499-----	2 pounds 4 ounces to 3 pounds 4 ounces-----	43.3	47.0	39.0	40.7
1,500 to 1,999-----	3 pounds 5 ounces to 4 pounds 6 ounces-----	14.6	16.9	12.5	14.8
2,000 to 2,499-----	4 pounds 7 ounces to 5 pounds 8 ounces-----	3.1	3.5	3.0	3.6
2,500 to 2,999-----	5 pounds 9 ounces to 6 pounds 9 ounces-----	.9	1.0	1.1	1.3
3,000 to 3,499-----	6 pounds 10 ounces to 7 pounds 11 ounces-----	.5	.6	.8	.8
3,500 to 3,999-----	7 pounds 12 ounces to 8 pounds 13 ounces-----	.5	.5	1.0	1.0
4,000 to 4,499-----	8 pounds 14 ounces to 9 pounds 14 ounces-----	.7	.7	.5	.5
4,500 to 4,999-----	9 pounds 15 ounces to 11 pounds-----	1.2	1.4	1.0	1.0
5,000 and over-----	11 pounds 1 ounce or more-----	4.5	6.2	0	0

NOTE.—Adapted from a table published by the Bureau of Records and Statistics, New York City Department of Health. The class intervals in grams are not precisely those recommended by reference 2. The avoidrupois limits have been inserted to illustrate presentation format and may not represent exactly the weight groupings used.

born dead or with poor prospects for survival. Mortality rates, based only on known birth weights, understate seriously the true rates. The size of the correction in mortality will usually be greater for fetal deaths than for neonatal deaths. Allocation of unknown birth weights can be handled through a number of procedures now in effect (2).

Table 1 illustrates the effect of adjustment on weight-specific neonatal mortality rates. The correction is greatest for the under 1,000 grams group, becomes negligible in the 2,500- to 4,500-gram range, and then reappears at higher weights.

Tabulation of Data

Tabulations of medical supplement data have a wider audience than maternal and child health administrators. The needs of medical society committees, hospital superintendents and staffs, and of interested physicians must also be kept in mind.

Reference 2 outlines suggested tabulations for birth weight and related characteristics. Reduced to skeleton form, the suggested tabulations are:

1. Live births (and neonatal deaths) classi-

fied by birth weight, race, and county of residence (with subtabulations for cities of over 50,000 population).

2. Live births (and neonatal deaths), classified by birth weight and individual hospitals (also group hospitals according to size).

3. Single live births (and corresponding neonatal deaths), classified by birth weight, race, and person in attendance.

4. Single live births (and corresponding neonatal deaths), classified by birth weight, race, and sex; neonatal deaths further subdivided by age at death and by cause of death.

5. Plural live births (and corresponding neonatal deaths), classified by birth weight, race, and sex; neonatal deaths further subdivided by age at death and by cause of death.

6. Live births (and neonatal deaths), classified by birth weight, race, period of gestation.

Note: This report does not cover such topics as complications of pregnancy and labor, operative procedure, birth injuries, or congenital malformation.

The cross-tabulation "Birth weight by area of residence" may throw light on possible relationships between environmental factors and incidence of immaturity. It will delineate

the geographical pattern for incidence of immaturity and help determine those areas needing added special facilities for care of immature babies. Where nearly all deliveries occur in hospitals, maternal and child health administrators would probably rely on hospital rather than area-of-residence tabulations for pinpointing the need for special facilities.

Data on birth weight for individual hospitals is usually more informative than data for hospitals grouped according to size. They enable an investigator to pick out hospitals diverging from the usual pattern. Published analyses should refer to the distribution pattern by individual hospitals, identifying individual hospitals by code number, if necessary, as well as presenting figures for hospital groups by size of hospital.

Only one hospital was found in Connecticut (1948) where the distribution of immature birth weights deviated significantly from the State average. Where such differences are found, they should not be accepted at face value. Scales and weighing procedures in an individual hospital may have been at fault and may have biased the results. One must assess the hospital practice and the type of people it serves in interpreting the findings. In the Connecticut hospital, later developments suggested that weighing procedures were at fault.

The question has been raised whether adjusted mortality rates based on weight-specific rates should be computed for individual hospitals. In my opinion, this should not be done routinely. Where differences in birth weight distributions are small, the changes produced by adjustment are negligible. If the deviations are major, the question as to whether they are real or classification artifacts must first be answered. If the weight differences are real, use of adjusted mortality rates could be justified. Inaccurate recording of weights rewards the hospital with a lower adjusted rate than warranted (when the bias is toward lower weights) or penalizes it with a higher rate if the bias runs in the opposite direction.

Interhospital mortality comparisons are clouded in many States because of complications caused by the presence of small maternity homes, and municipal and proprietary hospitals. Maternity homes may handle mainly

uncomplicated deliveries; proprietary hospitals may draw patients from a well-to-do clientele who constitute better risks; municipal hospitals usually treat medical indigents, who may be poorer risks, and may draw the emergency cases with poorer prognosis. Under these conditions, the factor of treatment and its effects cannot readily be disentangled from selection of cases.

These selection elements are minimized in Connecticut, where no more than two hospitals were engaged in large-scale obstetrics in any community, no municipal or proprietary hospitals were involved, and maternity homes were not permitted to operate. All general hospitals in the larger cities have active staffs, and outward appearances would indicate no significant differences in types of patients admitted. For these reasons the accompanying abstract of Connecticut data (1948-50) on neonatal mortality per 1,000 live births (unadjusted) by hospital may prove interesting (table 2). Deaths are tabulated by hospitals where birth occurred, grouped according to size of hospital.

The mortality differences between hospitals

Table 2. Neonatal deaths per 1,000 live births, by hospital where birth occurred, Connecticut, 1948-50 (partial listing)

Place of birth	Rate per 1,000 live births
Total deaths in State.....	19.5
Deaths in hospitals:	
Total, all hospitals.....	19.1
Hospitals with 2,000 or more births yearly..	18.0
No. 1.....	15.2
No. 2.....	16.3
No. 5.....	21.5
No. 6.....	21.7
Hospitals with 1,000-1,999 births yearly...	20.5
No. 1.....	16.5
No. 2.....	18.2
No. 8.....	21.9
No. 9.....	25.8
Hospitals with 500-999 births yearly.....	19.3
No. 1.....	16.0
No. 2.....	16.8
No. 8.....	22.3
No. 9.....	27.2
Hospitals with less than 500 births yearly..	18.4

cannot be attributed to chance factors. Assuming that the neonatal mortality rate for the entire State represented the true risk in each hospital, the differences between the observed and the expected number of deaths could have occurred by chance much less frequently than once in 100 trials ($\chi^2=52.6$, d. f. 24). This hypothesis must be rejected. Differences between hospital size groups were unimportant, compared to those between individual hospitals. The same results would have held if reported fetal deaths had been combined with neonatal deaths to compute combined loss ratios.

Mortality rates by individual hospitals provide a powerful tool for maternal and child health administrators. They not only point out places for improvement, but, when distributed to the hospitals concerned, stimulate the staffs to examine and take steps to improve conditions.

A standard table of major importance, useful for interarea and time series comparisons, is mortality by birth weight (table 1). The administrator will probably be most interested in following the time trends in his area for mortality in the various weight groups to see what results his program is producing. Where space permits, both unadjusted and adjusted (for unreported birth weights) weight-specific rates should be shown, so the reader can gauge the size of the correction involved. Separate presentation of neonatal mortality and fetal mortality is imperative. With differences in legal requirements for reporting fetal deaths, present interarea comparisons of fetal mortality are greatly restricted.

It is well known that sex and race influence birth weight distributions; male and white babies weigh more, on the average, than female and Negro babies (7, 8). Since female and non-white babies are generally more mature than male or white babies of equal weight, other things being equal, the former tend to exhibit smaller weight-specific mortality rates under 2,500 grams. The New York City data for non-whites bear this out.

Complications of Pregnancy and Labor

Tabular presentation should distinguish between the total births registered and the num-

ber of reports with answers to questions on complications. A count of deliveries exhibiting one or more complications should be presented, permitting comparison with the total number of complications reported. In Connecticut, the ratio of reported "complications" to "women with complications" has run between 1.10 and 1.15.

For clarity in presentation, grouping of individual complications under three major headings—complications of pregnancy, of labor, and nonpuerperal—seems desirable. The arrangement must be somewhat arbitrary because the line of demarcation between complications of pregnancy and of labor is not always distinct; for example, premature separation of the placenta could be associated either with the antepartum stage or with labor. Standard usage in the arrangement and grouping of complications can undoubtedly be developed.

The distribution of complications for plural deliveries departs noticeably from that for single deliveries and should be presented separately.

For single deliveries, complications affecting birth weights of babies weighing 2,500 grams or less should be distinguished from those for full-term babies. Further subdivision of birth weights expands the tables greatly, tends to obscure the results in a mass of detail, and should not be attempted as a routine measure. Plural deliveries are so few that the study of association between complications and birth weight can advantageously be confined to single deliveries. Data for plural deliveries could be accumulated and made the subject of a special report.

Tabulations of reports of complications by hospitals are of interest, primarily as a check on the quality of reporting from individual hospitals, taking into account any selectivity factor among patients. These reports offer the maternal and child health administrator some clues as to completeness of records maintained in various obstetrical departments. The maternal and child health administrator can use these tables as a springboard for making specific inquiries about record-keeping systems in individual hospitals. It is difficult to generalize as to where such inquiries may lead. Depending on the interest and cooperation of the hospital

staff, results might include revision of hospital forms and more frequent review of case records by chiefs of services.

In Connecticut (1948) the proportion of live births with complications reported ranged, by hospital, from 3.3 to 26.3 percent. In addition to such complications as dystocia, disproportion, and malpresentations other than breech (for which lack of precision in definition contributes to variability), reporting varied markedly for toxemias (other than eclampsia), placenta previa and other antepartum hemorrhage, erythroblastosis, and breech presentation.

Presentation of mortality data requires separate tabulation of complications for neonatal and fetal deaths. The general breakdowns for single full-term, single immature, and plural deliveries should be maintained. Preceding comments concerning separate presentation of fetal death and neonatal mortality apply here also. When the numbers observed are relatively few, consolidation of certain complications for the computation and publication of rates may be indicated. At best, such

tables are voluminous and the reader's task may be eased by arranging the complications in descending order of mortality.

Table 3 is an abstract of material on mortality according to complications. For convenience in reproducing the results, only the rates are shown. Antepartum hemorrhage was the complication of pregnancy with the highest combined mortality; hemorrhage, for complications of labor; diabetes was the leading nonpuerperal complication. The variable relationship between fetal and neonatal mortality and the mortality pattern for full-term and immature deliveries should be noted. Because of variation in reporting complications by hospitals, routine analysis of mortality by complications for individual hospitals would not be feasible.

Medical society committees and hospital staffs, as well as health departments, have always expressed keen interest in tabulations of delivery procedures for individual hospitals. In Connecticut, such data have been released, with the hospital identity concealed by code.

Table 3. Fetal loss per 1,000 births,¹ by complications of pregnancy and labor, Connecticut, 1948

Complications of pregnancy and labor	Total			Single, full-term			Single, immature		
	Combined fetal loss	Deaths under 1 month	Fetal deaths	Combined fetal loss	Deaths under 1 month	Fetal deaths	Combined fetal loss	Deaths under 1 month	Fetal deaths
Questions on complications answered.....	31.0	18.1	13.2	13.9	7.2	6.7	268	180	108
No complications.....	16.0	12.2	3.8	7.3	5.6	1.7	178	137	47.4
One or more complications.....	113	51.9	64.0	55.7	18.1	38.3	441	280	224
Complications of pregnancy.....	195	92	113	89	27	64	473	298	249
Antepartum hemorrhage (including placenta previa and premature separation of placenta).....	263	146	137	107	40	70	541	377	264
Toxemias (including eclampsia and hypertension).....	125	33	95	64	10	55	395	171	271
Infections of pregnancy.....	55	16	39	19	19	19	214	153	71
Complications of labor.....	92	31	63	62	17	46	432	233	250
Hemorrhage.....	495	56	466	418	20	406	862	500	724
Breech presentation.....	129	69	64	69	30	39	515	377	222
Malpresentation other than breech.....	62	21	42	48	16	33	333	111	250
Dystocia.....	46	22	24	34	12	23	128	89	43
Previous cesarean section.....	29	26	4	21	21	-----	77	40	39
Nonpuerperal complications.....	122	62	73	71	20	53	500	357	222
Diabetes.....	455	268	255	340	143	234	1,000	1,000	333

¹ Rates for "combined fetal loss" and "fetal deaths" are per 1,000 total births (i. e., live births plus fetal deaths). Rates for "deaths under 1 month" are per 1,000 live births. "Fetal deaths" refer to fetuses of not less than 28 weeks gestation.

Table 4. Percentage of live births by cesarean section in Connecticut hospitals, 1948

Size of hospital (number of births)	Average (group)	Individual hospitals
Total, State-----	5.6	-----
2,000 or more-----	6.4	12.1, 7.8, 5.4, 4.8, 3.2, 1.4.
1,000 to 1,999----	4.3	8.2, 6.9, 5.4, 5.2, 4.5, 4.2, 3.0, 2.2, 1.4.
500 to 999-----	6.3	12.5, 10.9, 8.3, 6.7, 5.2, 5.1, 4.9, 2.6, 1.9.
Less than 500----	3.0	10.0, 6.0, 4.1, 3.8, 2.8, 2.4, 2.4, 1.6, 1.3, 0.9.

These data have indicated little variation by hospital for version and extraction; the tabulations pinpoint a few hospitals with high rates for this complication. The variation has been more pronounced for mid- and high-forceps deliveries, but, again, the tabulations picked out a few hospitals with rates markedly above average.

The great difference between Connecticut hospitals has been in the proportion of babies delivered by cesarean section. The figures do not appear directly related to hospital size (table 4), although the lowest proportion of cesarean sections is found in the smallest hospitals. Differences of the magnitude observed must represent differences in concepts and procedures rather than differences in problems encountered.

The concepts underlying Lembcke's recent study (9) and investigations of delivery procedures would seem to be essentially the same. Increasing attention in the future will probably be devoted to vital statistics studies dealing with interhospital variation.

The proportion of deliveries by cesarean section has increased steadily in Connecticut during recent years. A similar trend has been evident in New York City and upstate New York. Mid- or high-forceps delivery, breech extraction, and version and extraction have declined (table 5).

Because of the great interhospital variation in proportion of cesarean sections, marked changes in the trend for cesarean sections are potentially possible. Repeated tabulations on delivery procedures at regular intervals seem desirable.

Not much demand has developed for detailed cross tabulations of delivery procedures by complications, since the selection of delivery procedure is generally dictated by the complication. Physicians have been satisfied with tabulations of operative procedures by broad groupings of complications.

Neonatal and Fetal Deaths

Studies made by Yerushalmy (10) several years ago demonstrated a relationship between neonatal and fetal mortality and birth order and age of mother. In view of the declining neonatal and fetal mortality rates, presentation of current data on these points should be encouraged. Where differences in mortality by birth order and age of mother still exist, some special tabulations of complications and birth weight by these factors might be undertaken to see if they could account for all or part of the differences in mortality.

Gardiner and Yerushalmy (11) demonstrated that the risk of neonatal and fetal mortality was much higher for mothers whose child-bearing history showed previous loss of children. This line of investigation could profitably be extended to consider complications reported for such women in a current delivery and the birth weights of the babies, as well as resultant mortality.

Medical certifications for neonatal deaths rarely allude to conditions present in the mother in the sequence leading up to the underlying cause of death of the infant. This is one reason why it is difficult to reconcile cause-of-death distributions for early neonatal and late fetal deaths, which theoretically should closely resemble each other. The situation might be accounted for in part by lack of information

Table 5. Change in percentage of live births by procedures specified, Connecticut, 1948 and 1941

Delivery procedure	Year		Percent change
	1948	1941	
Cesarean section-----	5.6	3.2	+75
Mid or high forceps-----	3.6	4.2	-14
Breech extraction-----	1.6	2.1	-24
Version and extraction-----	.3	.5	-40

available to the certifying physician concerning the obstetrical history of the mother. Neonatal death certifications could be reviewed in connection with complication data reported on the matching birth certificate to see if further inferences could be drawn concerning cause of death. This might lead to improvement of medical certifications for neonatal deaths.

The last revision of the standard stillbirth certificate removed the question on time of death—before or during delivery. Some people hold that this item helps in the interpretation of fetal death statistics and that causes of fetal death should routinely be cross-tabulated with time of death. States which have retained time of fetal death on their certificates should incorporate this element into their tabulations of causes of fetal deaths.

Drawing Samples for More Intensive Study

The assessment of preventability of fetal and neonatal deaths is a project which excites the interest of maternal and child health directors. The success which has attended the investigation of individual maternal deaths to determine preventability and the subsequent confirmation, as indicated by the decline in maternal mortality rates, of the findings that many of the deaths were preventable, has led many people to believe that the same methods of inquiry should be applied to fetal and neonatal deaths. A sampling approach would be indicated since there would be too many fetal and neonatal deaths for each to be investigated.

In Connecticut, a State Medical Society Committee to Study Stillbirth and Neonatal Mortality has recently been organized with both pediatricians and obstetricians represented in its membership. Members have been drawn from a large number of hospital staffs to secure a broad base of representation.

The committee is just beginning to study a sample of neonatal deaths. Standard sampling techniques are being used to select cases for study, so that inferences from the sample can be extended to the total neonatal deaths in the State. In Connecticut the decision has been made to draw the sample in the State office. The health department physicians doing the field work find that assembling of informa-

tion through review of hospital records and interviewing physicians is progressing satisfactorily. As yet, the committee has not fixed a procedural pattern for reviewing and evaluating the material collected.

Complete work-up of individual deaths calls, of course, for microscopic examination of tissues. This, too, could be fitted into the sampling scheme. Tissues could be stored in the hospitals temporarily until after the sample is drawn and specimens then discarded for deaths not included in the sample, if the specimens are not wanted for other purposes.

Statistical Program Operations

Tabulation of the birth statistics considered in this paper consumes a great amount of personnel and machine time. Many projects await study by public health statisticians, and the allocation of statistical resources to work demanding attention is a major responsibility confronting statistical administrators. This pressure automatically raises certain questions concerning such a major activity as the medical supplement program: Must the data be processed completely every year? If not, is continuous sampling the answer? Is a cyclical approach satisfactory? Can a complete analysis be done one year, dropped, and picked up in a later year? Would a 2- or 3-year cycle of operations be needed, using the initial year of the cycle to improve the quality of responses on the medical supplement?

The problems of State offices with respect to coding, tabulating, and other handling of records make the complete processing of records in selected years the most attractive approach. Many offices would have no difficulty in building up a cycle of operations in which medical supplements alternate with such projects as multiple cause-of-death tabulations, and with special tables and rate computations for census years.

Conclusion

Many studies have been stillborn when the prospective investigators have concluded the data were too unreliable to bear analysis. No one working with the birth certificate medical

supplements has ever believed that this material was a model of statistical precision and accuracy, but this did not deter the pioneers in this field, and some benefits can now be reaped from their work.

Much has been printed recently concerning computing machines and servomechanisms which have so-called feed-back facilities. The feed-back principle should be borne in mind in essaying the analysis of medical supplement data. Material is salvaged from the initial investigations, not only for its immediate interest, but as a means of stimulating the sources of information—the physicians—and encouraging them to improve their reporting practices. With repetition of the interaction cycle between physicians and statisticians, the quality of the data can gradually be improved. The handling of the medical supplement data on birth certificates, a generally accepted health department activity, may provide useful experience to statisticians in the problems and mechanics of handling medical care data. These statisticians will later attack problems concerning the collection and improvement in quality of medical data in other fields of interest to public health administrators.

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The complete text of this paper may be obtained by writing to the Bureau of Vital Statistics, Connecticut State Department of Health, Hartford.





The Practice of Public Health, 1952

“WE ARE MET to reexamine our responsibilities, to analyze our progress, and to plot our future course. During our deliberations we shall discuss the health needs and problems of the people whom we serve. We shall study new scientific and social developments which should be incorporated into public health programs, and we shall analyze the progress we have made in bridging the vast gap between scientific knowledge and its application to the health needs of the people. Underlying all these discussions will be a strong sense of our stewardship for the health protection of our nations, a realization that as public health workers we have both the privilege and duty of serving the people who have entrusted us with the responsibility of safeguarding their health and have given us a specific mandate to concern ourselves with the interests of health and life among the people.”

GAYLORD W. ANDERSON, M.D., Dr.P.H.,
President, American Public Health Association, 1951-52

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report of the
80th
annual meeting
of the
AMERICAN
PUBLIC
HEALTH
ASSOCIATION

and related
organizations
held at
Cleveland, Ohio,
October 20-24, 1952

Reader's guide on page 86.

Continued from page ii.

The APHA Conference Report

This is *Public Health Reports* third effort—the first being in 1950—to summarize the scientific and technical discussions at the annual meetings of the American Public Health Association and related organizations. We consider it a privilege so to serve our readers, many of whom have expressed their satisfaction with our previous efforts, and to be able to carry on as urged by the Executive Board of the Association.

The earlier pattern of a news-type reporting of the highlights of many of the sessions has been followed in this presentation, the second portion of which will appear next month. We have attempted to give the essence of the papers, but by no means the complete story in each case. We have endeavored to reflect accurately the intent of each speaker although necessarily we have had to take extensive editorial liberties in the interest of brevity and under the press of time. It must be clear, of course, that the author—not the Public Health Service—is the authority in each case for facts and opinions reported.

This is a selective report, largely because we work from authors' written texts as made available through the pressroom facilities of the Association at Cleveland, and by authors on direct request. Material which was not available in satisfactory script form obviously could not be used. Reporting of informal panel-type discussions is, in consequence, incomplete.

The report this year is, item by item, somewhat longer and possibly more complete than in the past since virtually all summaries were prepared from full texts. Even so, only highlights could be reviewed, reports averaging in length from 10 to 15 percent of the originals. Thus, reading of our news-reviews cannot in any way substitute in concept or details for examination of the full papers when published.

This special two-part section deals only with the scientific sessions. Association and section business and reports have not been reported, this being a function of the official *Journal*. No full papers, of course, are published in this summary report. Complete texts of leading papers have already begun to appear in the *American Journal of Public Health*. Subsequently, others may appear in *Public Health Reports* and in appropriate specialty journals.

Our appreciation is extended to the many authors who provided us with texts—especially those who did so early—and to the officers and staff of the American Public Health Association for their cooperation and encouragement.

THE EDITORS

policed—the description and exemplification of successful methods of preventing the progress of pestilences by stamping them out, the mapping out of the course of epidemics, and the demonstrated progress of science which is destined to grapple successfully with the combined factors of epidemic and other preventable diseases, show how great are the tasks and the triumphs which Preventive Medicine has proposed. . . .

Sanitary officers and boards of health have to perform their duties under laws which, in most of the States, are not worthy of an enlightened people. A sanitary system worthy of the present state of the physical sciences and of hygiene hardly has existence in any of the States. But in eight States a central Board of Health has begun its work of inquiry and the framing of a project of public health laws, a parliamentary commission in the Dominion of Canada is at present devising a sanitary code, and in nearly half of the States of our Union efforts to secure good laws and a sanitary system have commenced. Certainly it is not in vain that the American Public Health Association pursues its voluntary inquiries and now presents these contributions to a great cause in which philanthropists and statesmen are enlisted as co-workers with medical and sanitary authorities.

—ELISHA HARRIS, M.D., secretary of the Association, in an "Introductory Note" to "Public Health Reports and Papers presented at the meetings of the American Public Health Association in the year 1873."

The Control of Chronic Illness and Efforts in Rehabilitation

Chronic illness and rehabilitation were among the leading topics discussed by the some 4,000 professional people in public health who participated in the APHA's 80th annual meeting in Cleveland, Ohio. From Georgia came a report on a cardiac control program; from North Carolina came news of diabetes control clinics. Investigators in Canada reported on social and environmental factors in multiple sclerosis. Incapacitated American coal miners do not take kindly to enforced idleness nor public assistance, and a total physical medicine and rehabilitation program can realize important social and economic savings . . . such were some of the findings, summarized in the following.

Cardiac Clinic Network Feature of Georgia Plan

The cardiac control program developed in Georgia has, in the opinion of J. Gordon Barrow, M.D., director of the cardiac clinic at Grady Memorial Hospital, Atlanta, done more to advance the fight against heart disease than would have been possible by any other means with such a small expenditure of money. The program, made possible by the combined efforts of many individuals and agencies, both public and private, includes a State-wide network of clinics for diagnosis and care of indigent patients, professional education, and research.

When the program began, Dr. Barrow stated, only two cardiac clinics existed in the State, one at each of

the two medical schools. These were made into strong regional clinics with the intention that they would provide consultation services and diagnostic and treatment facilities for local clinics. At present eight local clinics are in operation and three more are ready to begin.

Initial Steps

Outlining the steps taken to develop a local clinic, he listed these: find qualified physicians willing to devote their time without charge to the operation of the clinic; obtain approval of the project by the local medical society; enlist the aid of the local health officer; and finally, call a conference of representatives of the State health department and the State heart association, the local physicians who have volunteered their services, the local health officer, and often members of local civic organizations to formulate final plans.

These clinics, according to Dr. Barrow, provide diagnosis and treatment, including surgery; utilize methods of prophylaxis to prevent heart disease or halt its progression; give medical, nursing, and social service care to patients with serious heart disease; provide a home-care program; and aid in rehabilitating patients. The average total number of patients visiting the clinics per month has been 2,911, Dr. Barrow reported. Home nursing visits average 830 per month. On the average 31 doctors attend each clinic session, of which there have been 82 per month.

A system of recording the diagnosis and functional and therapeutic classifications of each patient was devised, following the standards of the American Heart Association, Dr. Barrow explained. Copies of notes made by the physicians are sent to

the nurses in the field, and the nurses' reports are made available to the physician. "We feel that each member of the medical team must be fully familiar with what is going on if proper follow-up of the patient is to be accomplished," Dr. Barrow maintained. "Good records are the only possible way this can be done."

Professional Education

Discussing the educational phase of the program, the speaker noted that in the past 2 years more than 25 symposiums have been held under the sponsorship of the State health department and the State heart association to acquaint physicians and nurses with recent advances in heart disease therapy. He mentioned also that the clinics have co-operated in the educational program by holding staff conferences for the nurses and physicians and by making available their facilities for use by medical students.

"The research program is necessarily centered at the two medical schools," Dr. Barrow pointed out. At present several different cardiovascular research projects are under way. But, he added, each clinic is urged to sponsor clinical research programs since these require only carefully kept records and critical analysis.

Many Served Economically In North Carolina Clinics

The belief that the operation of a clinic for diabetes offers an opportunity for the public health department to do much good for many people for a comparatively small expenditure of money was expressed by W. B. Hunter, M.D., health officer of the Harnett County Health Department, Lillington, N. C.

"Six years ago," Dr. Hunter said, in describing the beginning of the Harnett County Health Department's clinic, "we found some diabetic patients who were not receiving adequate care. We helped a few

of these people with such gratifying results that . . . we soon found ourselves conducting a clinic for diabetes." Later, he explained, it was decided to admit obese patients too, since obesity and diabetes are closely related. The clinic has had a total of 506 patients, well over 1 percent of the county's population.

The management of diabetes is preventive medicine, Dr. Hunter pointed out. Physicians do not treat diabetes—they teach the patient how to manage his own individual case, he said. The objective is to prevent complications and to keep the patient as near normal as possible.

Clinic Procedures

When a new patient is admitted to the clinic, he continued, he is weighed, his height is measured, and his ideal weight is estimated. A urinalysis and a blood sugar determination are done. Usually, these data establish the diagnosis, show whether the patient is overweight, and give some indications of the severity of his disease. If it appears that the patient will require insulin, he is taught how to administer it. Finally, he is given instructions concerning diet. At this first visit, then, the patient is well started on the management of his disease. At subsequent visits the insulin dosage is regulated according to results of urine tests and occasional blood sugar tests. Diet is regulated according to the gain or loss of weight.

Describing the diets prescribed by the clinic, Dr. Hunter emphasized that they are simple and versatile. Diabetics do not require any special foods, he said, but if overweight they must restrict the total calories they consume. For several years, the clinic has used exclusively the meal plans and the booklet "Meal Planning," prepared by the American Diabetes Association, the American Dietetic Association, and the Public Health Service, as a basis for their diet instructions.

Dr. Hunter recommended that the staff for a diabetes clinic include a

physician, a dietician, a laboratory technician, and a clerk. The physician may be either the health officer or a clinician employed for the purpose. And, as happened in the Harnett County Health Department clinic, the nursing personnel may learn to serve as dietician and laboratory technician.

Social Factors Absent In Multiple Sclerosis

A comparative study of 112 multiple sclerosis patients and a selected control group of 123 representative individuals in Winnipeg, Manitoba, found no environmental or social factor that could be considered significant in the etiology or subsequent course of the disease, reported Knut B. Westlund, M.D., M.P.H., and Leonard T. Kurland, M.D., Dr.P.H.

Dr. Westlund is research associate of the department of epidemiology, Johns Hopkins University School of Hygiene and Public Health and Dr. Kurland is an epidemiologist with the National Institute of Mental Health and medical director of epidemiological projects, National Multiple Sclerosis Society.

Information obtained from each patient, they explained, included a thorough chronological and clinical history and description of himself and his illness, embracing such facts as important symptoms, previous illnesses, places of residence and number of rooms and persons in the households, occupations and hazards involved, emigration origins of himself or ancestors, travel, education, military service, exposures to animals, vaccinations and inoculations, and dietary habits.

Neurological and hematological examinations and serological tests for syphilis were made and the patient's hospital records were studied. No attempt was made to evaluate the influence of emotional upsets or minor trauma in the patient's pre-morbid experience, since it was felt that both the patient and his physician might tend to rationalize the

onset of his disease symptoms with such explanations. Except for questions relating directly to multiple sclerosis, similar information was elicited from the control subjects.

A comparison of the data showed no significant difference between the patients and the controls which might account for the onset of multiple sclerosis, the epidemiologists concluded. A controlled study of a large number of healthy people with a long follow-up period to see what types of them develop multiple sclerosis would be desirable, they added, but its incidence of 1 to 2 cases per 100,000 population per year is so low that the investigator can only obtain and try to evaluate pre-morbid information from persons already having the disease.

Rehabilitation Program For the Incapacitated

Incapacitated industrial workers do not remain unemployed or unemployable by choice, nor do they prefer to support their families through public assistance if there are any reasonable alternatives, declared Kenneth E. Pohlmann, rehabilitation director of the United Mine Workers of America Welfare and Retirement Fund.

UMWA rehabilitation efforts were begun in June 1948, said Mr. Pohlmann, by using outside (the mining areas) medical center services for the severely disabled, followed by expanded efforts when further needs, such as physical restoration services, were indicated. Subsequent steps included cooperation with Federal-State vocational rehabilitation agencies whereby selected patients, were referred for rehabilitation services to qualified agency representatives. By June 30, 1952, 8,693 handicapped people had been so referred by the UMWA.

As an example of the rehabilitation program's effectiveness, he continued, of 738 UMWA disabled beneficiaries leaving physical medicine or

rehabilitation centers by January 1952, 600 (81.3 percent) are still in discharge status and 169 are actively employed, 20 percent of them returning to mining. Thirty percent are in other industries, 32 percent are self-employed, 7 percent are in farming, 4 percent sought appointive or elective offices, and 8 percent are in diverse jobs.

Follow-up Care

All persons discharged from such centers are given extensive follow-up study and care by local physicians, hospitals, or one of the UMWA's 10 area medical staffs, Mr. Pohlmann said. Half of the 738 discharges show marked physical improvement, 43 percent have maintained various rehabilitation gains, and an impressive number have regained mobility with mechanical aids or are capable of self care.

Sixty-four percent of the 575 patients referred to local vocational rehabilitation groups participated in training and employment services. Only 18 percent quit because of physical regressions and unsatisfactory vocational goals. Mr. Pohlmann emphasized that if the 169 of these participants now employed were public assistance charges, the maintenance cost of each individual and family would be 500 to 1,400 dollars per year. This would entail a tremendous expenditure for the entire group over a number of years, he said.

Present workmen's compensation, relief and rehabilitation programs are inadequate to do a constructive job in rehabilitating the severely disabled, he concluded.

Washington, D.C., Solving Problems of Disabled

A total physical medicine and rehabilitation program offers the community an opportunity to realize significant economic and social savings and, more important, to help restore to the disabled person that

human dignity which is lost to the helpless and the dependent, declared Josephine J. Buchanan, M.D., of the Division of Chronic Disease and Tuberculosis, Public Health Service.

The Program

To show how such a program can be developed and what it can accomplish, Dr. Buchanan described the program begun 2 years ago at Gallinger Municipal Hospital in Washington, D. C.

"We began with two things," she said, "the barest minimum in personnel, space, and equipment, and a firm belief in the validity of the work we proposed to do." She explained that the philosophy on which the program is based is that a patient is not well until he is returned to his community as nearly a whole human being as our science, our work—and equally important, his effort—

can make him. To cure a patient of a disease or heal him of an injury is but the first step in the total treatment of a patient.

Home-Made Devices

Certain basic specialized medical equipment had to be purchased, she remarked, but the greater part of the equipment was built by the hospital: devices for lower and upper extremity exercises, parallel bars, practice stairs, and various self-help devices. A "gadget board" holding items, such as a dial telephone, water-faucet handles, and light switches, was devised for persons with residual disabilities in their hands and arms. An outdoor functional activity area, including a gravel pit, loading platform, garden, obstacle course, and even a city bus, was also developed, primarily for training those who earn their living by manual labor.

"Our Basic Mandate . . . To Keep People Well, Not Simply Keep Them Alive"

In his APHA presidential address, Gaylord W. Anderson, M.D., Dr.P.H., Mayo professor and director, School of Public Health, University of Minnesota, said:

"Many definitions of public health have been advanced, but probably none so simply or so clearly expresses the will of the people as the 1869 statute establishing the Massachusetts State Board of Health and instructing that board to 'take cognizance of the interests of health and life among the citizens.' No other concept has had comparable influence in shaping the course of the public health movement in this country . . . [It] has governed the evolution of public health and still defines the scope of our activities . . ."

"Public health is an organized community program designed to prolong efficient human life. It has no artificial limitations that would restrict its activities to certain types of problems. It must deal with and endeavor to combat those forces that tend to impair or to shorten efficient human life and must meet each problem according to its particular needs. The essence of democracy is the concept of rule by the people, who have a right to protect themselves against all forces that lead to illness or to death. As public health workers and servants of the people we have been specifically instructed to 'take cognizance of the interests of health and life among the citizens.' If we neglect or fail to do so we will be derelict in our duty."

(Dr. Anderson's remarks appear in full in the *American Journal of Public Health* for November 1952, pages 1367-1373.)

The development of special devices, Dr. Buchanan pointed out, requires only a knowledge of the needs of the patient and the ingenuity to fulfill those needs.

Most important to remember, she said, is that "this newest and oldest form of medical care" must begin immediately with the onset of the disabling condition and must progress concurrently with the patient's other medical care. Delay in beginning treatment may mean failure.

60.9 Percent Independent

The program has given care to about 2,000 patients, she reported, 60.9 percent of whom have left the hospital totally independent and another 21.6 percent have been made partially independent. She mentioned two particularly dramatic cases—one, a young quadriplegic who, through the use of a special splint, has been enabled to take up cartooning; the other, a young man paralyzed in a swimming accident who now manages to type his correspondence school lessons.

Suggests Activities

Dr. Buchanan suggested the public health officer, or other member of a health department staff, as the person in the community to stimulate action in developing a program of physical medicine and rehabilitation. He can acquaint the community with the ways in which total restorative and rehabilitation services can help solve the problems which surround the disabled. He can participate on health and welfare planning committees. He can offer consultation service to his local vocational rehabilitation office and to the welfare department. He can encourage physicians to extend their limits of responsibility to the disabled patient. He can encourage the voluntary agencies to join together in planning for such a program.

Community Organization for Health: Practice and Precept

Concepts of "community organization for health" received refurbished definitions buttressed by concrete examples of cooperative action from widely separated areas of the country at sessions of the Conference for Health Council Work.

Under the title, "Community Planning for Local Health Services," reports were heard from Wisconsin, Massachusetts, Ohio, Pennsylvania, and Virginia. An evaluation of current concepts and a discussion of local relationships to national programs completed the presentations, all but one of which are reviewed below.

Community Organization Welds Social Groups

Discussing "new concepts" in community organizations for health—concepts which he felt were not new but did need review—Earl Lomon Koos, Ph.D., chairman of the sociology department of the University of Rochester, said:

"Community efforts directed toward better health are necessarily custom built. . . . Community organization for health cannot be carried on in an icy apartness from the social worlds in which the people live for whom it is designed, and because community organization cannot ignore the strength of the factors which create distinctive values regarding health, and which place

Practice of Public Health, 1952

Reader's Guide

	Page		Page
Chronic illness, rehabilitation	83	Medical administration	118
Community health organization	86	Weight control	124
Bacteriological research	90	Handicapped children	127
Home care	92	Infectious hepatitis	130
Cancer control	95	General practitioner	132
Overseas reports	99	J. W. Mountin memorial	134
Laboratory relationships	103	Venereal disease	136
Poliomyelitis	105	Professional training	138
Laboratory methods	108	Public Health in Transition	
Tuberculosis	112	A pictorial album beginning on page	88
Industrial hygiene	115		

those values high or low in the whole hierarchy of values that are part of American life. For we must remember that health is a value—and one which is forever in competition with other values in our society."

In Dr. Koos' view, community organization is a form of activity which attempts to "weld together" the individual members and groups of an area into "one group having a common purpose." He went on to discuss two kinds of concepts: those related to the individuals and groups, and those related to community organization as a social process.

Three Community Groupings

There are several types of identifiable groups in the community, Dr. Koos pointed out. The first centers in "ethnic identification," that focused upon the recognition of a common religious, nationality, or racial characteristic. "To plan programs without understanding the prescriptions and proscriptions of behavior which are present in each group's culture is to be unrealistic about what can be accomplished through formal organization."

"Ethos identification" is a second group, pointing up the reality of social class membership, the sociologist noted. He called attention to a recent study of a community of less than 5,000 which shows "that there are sharp differences in health attitudes and behavior among the social strata of that community, and that these relate very directly to the way in which that community organizes for health."

The third grouping centers on the family, which functions as an active agent in providing an atmosphere in which health can flourish and as an agent in caring for the individual in time of illness. Dr. Koos underscored the fact that the family also, "is the matrix within which many basic ideas and attitudes of the young are formed, and that it is genuinely effective in maintaining such ideas and attitudes throughout the adult years."

The Family Matrix

"We may well search," Dr. Koos went on, "the logic of industry- or school-centered programs that ignore the importance of the family as a 'conditioner of attitudes,' and that may send the individual back into his family to face conflicting ideologies about health and its value. . . . Such programs can work effectively only if they send the individual back to his family prepared to adjust differences that may have been engendered, to make him, in effect, a health organizer in his own small family world. If the individual is not so prepared—because the health program ignores the individual's emotional ties to his family—the cost in tensions and frustrations can outweigh any small good the program may have accomplished."

Turning to community organization as a social force, Dr. Koos recalled the truism that the individual gains from his membership in the group, and contributes to that group, only in proportion to his participation. The condition for effectiveness was described as an "atmosphere" in which the members have high morale, the opportunity and encouragement to communication with each other on a democratic basis, and the opportunity to "define the situation" or to "establish common values" on equal terms.

Conversely, the speaker pointed out that there are three concepts that can only inhibit effectiveness. One of these, he said, is the idea of the "hierarchy of ability," the belief that "we know what is best for people." Another is the "vested interest, that pride of possession and proprietary interest that tends to exclude others from dynamic participation." The third he cited as "the domineering need to dominate, characteristic of many individuals who stem from the authoritarian past."

"We cannot deny," Dr. Koos maintained, "that there is a hierarchy of ability, but it should be pointed out

that special abilities and knowledge should serve only to commission those who possess them to help the less fortunate to gain needed insights. It is not easy for many members of the community, especially those with a strong sense of *noblesse oblige*, to rid themselves of the second and third of these concepts, but somehow community organization must find the means—again through the group process—by which these can be abolished."

Milwaukee Groups Study Postwar Problems

Milwaukee County, Wis., like other metropolitan areas, faces public health problems resulting from postwar expansion and has begun to interest itself in community health planning, declared John S. Hirschboeck, M.D., dean, Marquette University School of Medicine. The citizens themselves, their elected county officials, public and private health agencies, and the Community Welfare Council of the city of Milwaukee are cooperatively planning public health programs.

County citizens and part-time health officers of the 18 suburban communities were opposed to a suggestion for a combined city-county health department. Despite some opposition, but facing an increasing number of complaints about inadequate sewage disposal, the Milwaukee County board of supervisors created a citizens' committee to study county public health needs, explained Dr. Hirschboeck. The citizens' committee, with the help of the research department and the social planning committee of the community welfare council, searched for a way to meet present public health needs without disrupting existing suburban programs.

Dr. Hirschboeck outlined the committee's proposed plan: A county bureau of health services would operate under the direction of a full-time public health officer. According

to their requirements, suburbs would purchase services from the bureau. The cost of operating the bureau would be prorated among the participating suburbs. The bureau would be responsible for sanitation in the county parks and would supervise medical aspects of civil defense planning. Hearings on the proposals have not been completed.

Ohio Emphasizes Local Health Planning

In Ohio, State public health planning is being stimulated by 50 community health councils and by many local units organizing health councils, reported Sewall O. Milliken, M.P.H., chief, division of public health education, Ohio Department of Health. Rural Ohio counties have received nation-wide acclaim for their health studies and successfully executed plans, he said.

Active local participation in State health planning is the concern of the Ohio Rural Health Council, organized in 1941, explained Mr. Milliken. Composed of 46 members represent-

ing 22 State organizations, an equal number of elected rural members, and 2 representatives of the Agricultural Extension Service, the council has developed a definite relationship between State and local community health service planning, by placing emphasis on local responsibility and by aiding local activities. Health education, dissemination of health information, the training of leaders, and study and survey of individual area health needs are projects under council sponsorship.

Other Organizations

The Ohio Committee on Public Health, an outgrowth of the Ohio Rural Health Council in 1949, studied the State's financial obligation to local health departments as provided by law. Other public health organizations cited by the author for their interest are: the Ohio Citizens' Council for Health and Welfare, the Ohio Public Health Association, and the State Planning Committee for Health Education.

An example of productive responsibility shared by several organizations is the brucellosis control pamphlet which Mr. Milliken de-

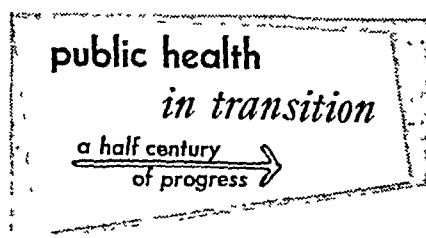
scribed as prepared cooperatively by the Ohio State Medical Association, the Ohio State Veterinary Medical Association, the State Departments of Health and Agriculture, and the Ohio State University Agricultural Extension Service.

Council Improves Services

Reorganization and expansion of city, county, and suburban health departments, a children's mental health center, hospital construction, a tuberculosis registry, a 5-year experiment in mass health education, institutes and courses in community health programs—these are among the accomplishments credited to the Metropolitan Health Council of Columbus, Ohio, according to the report by Russel G. Means, M.D., past president of the council.

Pennsylvania Revamps Laws and Structure

The revamped Health Department of Pennsylvania was described before the Conference for Health Council Work by Gilson Colby Engel, M.D., professor of clinical surgery,



The first 5 decades of America's 20th century have been a time of social and economic change and development . . . a time of population growth, sparked by immigration and the call of a free and bountiful land . . . a time of industrial expansion and urbanization, producing a rising standard of living and a greater longevity. This half-century has been a time of change and challenge to a new amalgamation of professions: public health. In these 50 years many needs, many problems came into view.

1900 Tuberculosis is leading single cause of death . untreated water, unpasteurized milk spread enteric diseases . one-third of all deaths occur under 5 years . 19,000 diphtheria deaths . heart disease and cancer deaths increase . influenza epidemic strikes Nation . pellagra, rickets, goiter prevalent . 9 mothers die for 1,000 live births . traffic deaths appear among "first 10 causes" . malaria costs Nation half-billion dollars annually . 100,000 smallpox cases in 1921 . health hazards in industry mount . chronic diseases

1930 cause half of all deaths . over 500,000 VD cases reported each year . half of Nation's hospital beds for mental patients . 6 million sick on average winter day . **1940** disabling illness rivals premature death . shortages in personnel and facilities hamper health services . proportion of 65-year-olds doubles since 1900 . industrial and **1950** community wastes pollute United States waters . atomic age introduces new problems . health named a major factor in building international peace.

Beginning on the facing page, Part I of this album summarizes recognized needs and primary programs up to mid-century. Part II—next month—focuses on current and developing areas with an eye to tomorrow.

University of Pennsylvania Graduate School of Medicine, Philadelphia.

The Medical Society of the State of Pennsylvania, the 46 member organizations of the Pennsylvania Health Council, and the League of Women Voters were instrumental, he said, in the campaign for new health legislation, and the changes in the State's health organization were based on recommendations made in a survey by the American Public Health Association.

The APHA survey, "Keystones of Public Health in Pennsylvania," was used as a guide for the public health program reforms, Dr. Engel continued. The new laws created an Advisory Board of Health which advises the Secretary of Health and plans and fosters new health legislation; a merit system, applying to all public health personnel, to assure permanence of employment, equality and adequacy of pay, and impartial treatment, and to make provisions for economic security upon retirement; permissive legislation allowing any community to set up its own local health unit.

Community Units

The objective in Pennsylvania is to decentralize health services to the local level, with power to control at that local level, stated Dr. Engel.

The permissive legislation allows a community to set up its own health department, Dr. Engel explained. This local health unit, using qualified personnel, should provide six basic services: vital statistics recording; communicable disease control; environmental sanitation; laboratory services; maternal and child health care; and health education. One such unit now operating in Butler County is showing good progress, he said.

The Pennsylvania Health Council works closely with the Secretary of Health and the Advisory Board of Health. It is fostering the local health unit plan in communities by education programs.

In Pennsylvania 78.4 percent of the population are covered by five

Blue Cross plans, the Intercounty plan, and commercial carriers against hospital costs. A Blue Shield plan is State-wide in activity and growing rapidly in membership.

"Health education is the prime step in making the citizens health conscious, and it is only when they become health conscious that we get real support in projects for prevention of illness," concluded Dr. Engel. "The educational job with the public is monumental and never ending as new generations are born."

Rural Health Progress Noted in Virginia

Growing out of the need of rural people for more adequate medical services, the Virginia Council on Health and Medical Care has stimulated health progress in Virginia since its beginning in 1940, Edgar J. Fisher, Jr., director, told the Conference for Health Council Work.

Mr. Fisher listed many accomplishments. The council, he told the conference, has:

Spearheaded and promoted an over-all health program with emphasis on coverage of the State with public health services. Now 91 of the 98 counties have full- or part-time health officers.

Centered attention on the mentally

ill in State mental hospitals. Institutions are becoming hospitals.

Taken the initiative in getting acceptance of the Hill-Burton hospital program, hospitalization of the indigent, and the regional hospital plan through which interns from the two medical schools are rotated to seven hospitals in the State.

Assisted Negro hospitals in meeting American Medical Association standards for approved internships.

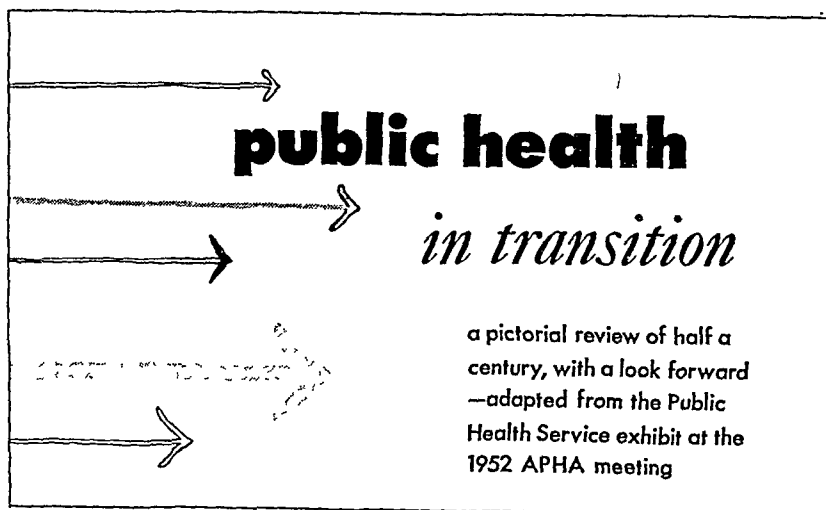
Worked for tuberculosis and cancer control, transforming beds in sanatoriums from pavilion to hospital type and establishing 11 tumor clinics.

Supported programs for medical, dental, and nursing scholarships (50, 4, 74, respectively) offered alike to white persons and Negroes. Doctors pledge a year of rural practice for each year of scholarship.

Aided medical colleges in improving facilities for training health personnel; encouraged teacher training institutions to build adequate health curriculums.

Recognized the need for recruitment of medical auxiliary personnel, beginning at the high school level, and adequate salary schedules to make recruitment possible.

Inaugurated a nationally recognized physician placement service administered by the council to encourage doctors to settle in rural areas.



Sponsored a conference for workers with handicapped children as a result of which the Nemours Foundation has granted a substantial sum for strengthening the program.

Helped local health councils get started and interested the nutrition council in becoming a standing committee of the health council.

Health Programs Depend On Citizen Participation

Health councils are formal expressions of the trend by which public health has become a community endeavor and has ceased to be the exclusive domain of professionals, Harald M. Graning, M.D., regional medical director, Federal Security Agency, Region V, Public Health Service, told a joint session with the Conference for Health Council Work.

Public health has broadened from the control of contagious diseases to treatment of delinquency, mental and emotional disturbances, ills of the aging, obesity, and alcoholism, Dr. Graning remarked. The expansion of health planning is observed

in such national programs as that on aging, he noted. Medical research and medical treatment are the core of any planning, but the aging program's broad sociological scope takes it "beyond the embrace of medicine," he said.

Dr. Graning said that the consequences of the decreases in communicable diseases are to be seen everywhere and noted that the professional, the specialist, and the laboratory isolate are more and more sharing the field with those who practice where medicine allies itself with the social sciences. The effect is to think in broad concepts rather than specific disease entities when planning the integration of local, State, and national programs, he believes.

Council's Impact

Conquest of the social problems of disease depends to a major degree on community participation in health services, the regional medical director stated. There is a practical value in selecting members of the community for service on health councils, for they are often in a much better position than professional or official members to see a

program in its entirety and to identify any lack of balance or excess emphasis on professional specializations, he advised. Citizens with executive capacity and budget experience or with knowledge of resources and relative needs in program fields and welfare areas could increase the competency of a health council in fiscal and budget matters, Dr. Graning said.

"Participation in a health council by nonmedical members of the community may be vital in recalling the professional to the felt needs of the community which may be quite different from what he imagines them to be or perhaps even wants them to be," Dr. Graning asserted.

The effectiveness of health councils will be multiplied by their gaining acceptance before legislative committees or budget groups prior to decisions which may mean the life or death of a program. Many councils have permanent committees on legislation to analyze Federal, State, and local legislation affecting health programs. "If there is any more important job than this, which a council or its legislative committee can do, in relating its own plans to other health programming, I do not know what it is," said Dr. Graning.

New Research, Service Roles For the Bacteriologist

The increasing development of antibiotics and their widespread use is creating new problems for, and laying new responsibilities upon, the bacteriologist and his laboratory. But these are only a few of the newer and expanding areas of activity in which the laboratory figures, as shown by review of the many papers and discussions presented before the

APHA laboratory section and related groups.

Laboratory Has Share In Therapy Guidance

The introduction of new antimicrobial agents has caused a shift in the responsibility incumbent upon the bacteriologist, said Frederick C. Fink, Ph.D., coordinator in the

hospital laboratory advisory service of Chas. Pfizer and Co., Inc., Brooklyn, N. Y.

The speaker based his remarks on the antibiotics conferences held in 100 large cities in this country and Canada at which antibiotic testing authorities discussed the observations made in the bacteriology laboratories of medical schools, public health facilities and hospitals, and industry.

Mr. Fink pointed out that now the laboratory faces the tremendous problem of guidance for antibiotic therapy after the cause of infection is discovered by the clinician. In shared responsibility, the clinical-diagnostic laboratory and the industrial research facilities are develop-

ing assay techniques and sensitivity tests—reliable indexes to the therapeutic effectiveness of antibiotics, he said.

Historical Stage

The past 20-year history of laboratory bacteriology was divided by Mr. Fink into three stages: the pre-sulfonamide, the sulfonamide to penicillin, and the penicillin to "broad-spectrum" antibiotic (chloramphenicol, aureomycin, and terramycin). During the first stage, a bacteriology laboratory received clinical specimens, made and studied smears and cultures, and then made a report. With the etiologic agent thus identified, the clinician usually decided upon the course of therapy from among the palliative or specific curative drugs at hand.

Soon after the clinician and bacteriologist became aware that some cases did not respond to sulfonamide therapy, Mr. Fink continued, researchers developed in vitro sulfa sensitivity tests on pathogen isolates. Doctors then found that in vitro tests, using the entire family of available sulfonamides, saved much haphazard choosing of drugs to suppress infection.

Antibiotics

From the extension of the original work on penicillin came the antibiotics. Mr. Fink explained it was soon learned that many of the sulfa-resistant organisms were penicillin-sensitive and that many of the penicillin-resistant strains were sulfa-susceptible. Carefully performed laboratory sensitivity tests predict the response of organisms, Mr. Fink indicated. The broad-spectrum agents, bacitracin, polymyxin, streptomycin, and others, each with a slightly different spectrum of activity and varying degrees of toxicity, are used for routine check of microbial sensitivity in vitro.

Techniques in laboratories will continue to be determined by the mode of performance and the validity of conclusions, Mr. Fink said.

The ideal sought by scientists hinges on the care with which they select for adoption the newly described techniques of other workers, and the manner in which they approach and tackle original research problems.

Popular Tests

The three most popular techniques for in vitro testing, the broth dilution, the agar dilution, and the agar diffusion (disc-plated) methods, have in common six features which Mr. Fink lists as: inoculum; preparation and storage of antibiotic stock solutions; choice of diluent medium; pH of the medium; time and temperature of incubation; and interpretation of the tests.

"Whichever technique is adopted, it should definitely be standardized for that laboratory with respect to the inherent variables," he suggested. "We must more often rely upon information from the laboratory as we realize the existing response variation among species of the same genus or among strains of the same species."

Mr. Fink stressed that the only absolute criterion of success or failure in the use of one or another sensitivity testing technique is the clinical response of the patient following administration of adequate dosage of the agent indicated as "drug of choice."

Laundry Recontamination Hazards Emphasized

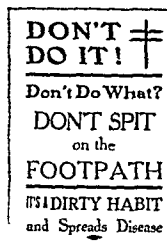
Laundry processes are efficient in removing bacteria from fabrics during washing, but the materials become recontaminated in the spin dryer or while hanging in the laundry to dry, reported Brooks D. Church, M.S., and Clayton G. Loosli, M.D., of the preventive medicine section, department of medicine, University of Chicago.

In an extensive bacteriological study in two laundries—one hospital and one commercial—it was found that during the sorting of linen and other activities the air became contaminated with bacteria and in turn contaminated clean woolen blankets and fabrics.

Also, airborne bacteria were drawn through the spin dryers and impinged on the washed textiles, and while large numbers of organisms were killed in ironing, many survived. One factor in survival, they stated, is the extraneous dried mucus covering the bacterial cell.

The findings in this study are of public health importance, they maintained, because the surviving organisms, mainly nonhemolytic and alpha streptococci and *Staphylococcus albus* and *S. aureus*, are all potential human pathogens. Clean

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linen which has been recontaminated in the laundry may be the source of serious infections in hospitals and military barracks.

Authorities should recognize the danger of recontamination of washed bedding by airborne bacteria dispersed while sorting and handling unwashed linen, they concluded, and should institute preventive measures by requiring proper construction, ventilation, and management of laundries, both hospital and commercial.

Solid Immunity Provided By Diphtheria Toxoid

A high level of immunity to diphtheria and tetanus can be induced in adults by small, properly spaced doses of precipitated diphtheria toxoid, Geoffrey Edsall, M.D., director of the Commission on Immunization, Armed Forces Epidemiological Board, Walter Reed Army Medical Center, and J. S. Altman, com-

mander, Medical Corps, United States Navy, reported.

In an investigation of diphtheria-tetanus immunity, 1 Lf-unit doses of precipitated or adsorbed diphtheria toxoid were given to 519 volunteer Navy Service School students, they stated. The first two doses were administered 3 weeks apart, the third, 5 months later. Antitoxin titers were determined before the first and third doses and after the third dose. After the third dose, they said, 250 of the 252 men who completed the study showed solid immunity.

Antibiotics Assayed By Serial Dilution

The application of antibiotic therapy for the control of infectious diseases necessitates the adaptation of antibiotic assay methods to routine

use, maintained Carolyn R. Falk, B.S., bacteriologist in the New York City Department of Health. In the past 9 years, the antibiotic testing unit of that department has tested more than 2,700 organisms for antibiotic sensitivity and over 10,000 body fluids for antibiotic level, Miss Falk reported.

The laboratory technique found to be the most practical for both tests is the test-tube twofold serial dilution method. It is easily mastered by the average technician, affords more quantitative results than the disc-plate method, and distinguishes between bacteriostatic and bacterial levels, Miss Falk stated.

She described the method briefly, pointing out that the tests for the new antibiotics follow essentially the same pattern as those for penicillin and streptomycin. In determining possible effective pairs of antibiotics, the scheme suggested by Jawett and co-workers is of assistance, Miss Falk said.

Experience With Home Care In Four Large Cities

Planned medical care at home offers striking promises of economy of operation and satisfaction for patients and relieves pressures on hospital occupancy, but many problems remain—particularly those involving the financing of services for the medically indigent.

These were among the main points presented before a joint session of the health officers, medical care, and public health nursing sections of the APHA, with the Conference for Health Council Work.

Boston's Voluntary Plan Has Financing Problem

Financing medical care for the medically indigent remains an unsolved problem for a voluntary project, Henry J. Bakst, M.D., indicated in a discussion of a home care pro-

gram that meets the dual purpose of serving the needy and providing a vehicle for medical education.

Dr. Bakst, professor of preventive medicine at the Boston University School of Medicine and director of home medical and out-patient services for the Massachusetts Memorial Hospitals, based his observations

largely upon the long experience of the two institutions. A home care program for the needy and medically needy has been a joint activity since 1875.

Public relief agencies financed by Federal, State, and local funds help the totally needy meet the cost of medical care, Dr. Bakst explained. But this group, he said, makes up only one-third of the annual patient load of the Boston home medical service, about 35 percent of the 15,173 home calls made in the 12 months from April 1950 to March 1951.

The Medically Needy

Two-thirds of the visits are made to the medically needy—persons who are able to provide for ordinary day-to-day needs but cannot meet medical costs, he said. Usually, nonofficial agencies, such as the hospital volunteering the service, must subsidize the medical care for this group, he stated.

Outlining the Boston program briefly, Dr. Bakst pointed out that eligibility for admission for out-patient treatment in the medical school-hospital program is based on an income limitation of \$40 a week for a single person. Groups of senior medical students provide the medical service under the supervision of two full-time second- and third-year residents and the staff of the department of preventive medicine. The service is supplied on request to eligible persons among the 50,000 in the square-mile area surrounding the hospital and school.

From November 1949 to October 1950, 84.23 percent of the patients were treated at home, 8.83 percent were referred to the out-patient department for further evaluation, and 6.94 percent were admitted to the hospital.

Six Basic Elements

Dr. Bakst named six requirements as essential to a home care program:

1. The services and resources of a general hospital.
2. Coordinated use of community resources such as the visiting nurse association, the health department, the family society, and other official and voluntary health and social agencies.
3. Centralized administration with emphasis on continuity of care and unit records.
4. Integrated cooperation of professional personnel—especially the physician, visiting, public health and school nurses, and the medical social worker—for consideration of the patient as a social being in his environmental setting.
5. Specific geographic area of responsibility in the larger cities.
6. Adequate financial support, with particular attention directed to the problem of medical indigency.

Dr. Bakst noted that hospitals participating in a home care program extend their services beyond the institution walls and add a real contribution to the health of the community. Such a program becomes, in part, the nerve and com-

munications center of personal health services for the community area, he said.

Hospital Stay and Costs Reduced by D. C. Project

Home care service for patients with long-term illness saves \$100 per patient by reducing hospital stay and costs of patient care, Sidney Shindell, M.D., in charge of the home care pilot study at Gallinger Municipal Hospital, Washington, D.C., told a joint session with the conference of Health Council Work.

The home care unit was set up as an independent administrative unit at Gallinger Hospital which treats indigent patients in cooperation with the District of Columbia Department of Health and Hospitals. Its purpose, Dr. Shindell said, was to determine: the nature of the eligible patient population; the effect of home care in reducing hospital stay costs; and the extent to which the program conserved the total number of beds. By a random selection, 177 eligible patients were divided into a study group and a control group. The control group was observed to determine what happened to such individuals using existing community facilities. Dr.

Shindell made the following points in his report.

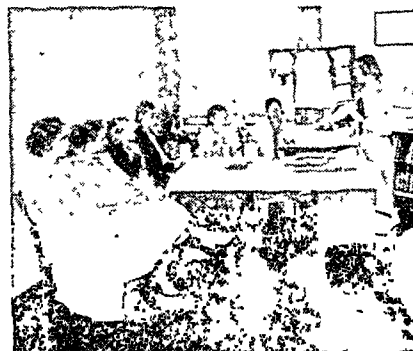
Potential Is 2.1 Percent

During the study, approximately 7,500 patients were admitted to Gallinger Hospital. Of this total, 5.5 percent were medically qualified for home care service, but two-thirds of these were disqualified because of inadequacies in the home situation. This is equivalent to a home care potential of but 2.1 percent of all admissions.

The home care patients averaged 17.2 days stay in the hospital, 24 days less than the patients in the control group. They received 118 days of home care. The cost of hospital care was approximately \$13.50 per day and of home care, \$3.70. Significant savings to the community accrued during the 24 days of home service; but the costs of the two groups paralleled each other upon the discharge of the control patient to his home with out-patient care.

Hospital beds made available by the use of home care service totaled 10 or an equivalent of 1.9 percent annual increase in available beds. The savings in bed availability, like the savings in cost of care to the community, would be increased if a larger proportion of medically suitable patients had adequate homes or if domiciliary facilities were available.

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physicians or full-time physicians employed especially for visiting home care cases, have taken their place.

In spite of these difficulties Dr. Kogel feels that the "home care idea has given us in the Department of Hospitals a breathing space until modernization and replacement programs are completed and it has made a permanent place for itself in the scheme of hospital operation."

of filling immediate and direct patient needs. However, it proved to be excellent for teaching medical students, and made information about follow-up of cancer patients available to the tumor clinic staff teachers, Dr. Pfeiffer and Dr. Lemon reported.

The daily case load ranged from 1 to 11 patients, usually varying from 7 to 11; visits totaled 439, an average of 8 per patient before

death, hospitalization, or other disposition. Indigency varied from absolute, in terms of public assistance and hospital ratings, to partial financial lack. Occasionally a staff specialist referred a patient who was a suitable subject for teaching purposes. Ages of the patients were 21 to 90 years; average, 61 years; 84 percent over 50. Most women were between 50 and 61; the men between 60 and 70.

Terminal Cancer Patients Receive Home Care

Home care of indigent terminal cancer patients over a 2-year period made 676 hospital days available to persons with acute illness or chronic disease necessitating hospitalization, and saved the hospital \$12,000 as well.

These results of a study at the Hospital of the Woman's College of Pennsylvania, Philadelphia, to determine the feasibility and value of providing medical care for terminal cancer patients who could be cared for at home as well as, or better than, in a hospital bed were reported by Mildred C. J. Pfeiffer, M.D., M.P.H., director of the division of adult cardiovascular diseases, Pennsylvania Department of Health, and former director of the department of oncology of the Woman's College of Pennsylvania, and Eloise M. Lemon, M.D., fellow in oncology and clinical assistant in medicine at the college.

The need to continue the hospital's responsibility for medical management of indigent cancer patients was recognized by the Woman's Medical College shortly after establishment of a tumor clinic in September 1948, the physicians said.

Case Load

The medical social worker and the physician cooperated closely in selecting patients for the study, which was originally conceived as a method

Cancer Control Projects And Research Activities

That progress against cancer—in terms of control if not direct prevention—is possible was suggested in reports of current activities from Puerto Rico, Connecticut, and Massachusetts. At the same sessions of the Public Health Cancer Association and the epidemiology section, new data were presented on socioeconomic aspects, cancer detection, medical teaching, and the role of heredity.

90% of Cancer Patients Served in Puerto Rico

At least 90 percent of the cancer patients in Puerto Rico now receive diagnosis, treatment, or follow-up care through a cancer control pro-

gram of the Puerto Rican Government, reported Lyndon E. Lee, Jr., M.D., Roberto Fuentes, B.A., and Luisa Lefebre, B.S., from the Puerto Rico Department of Health and the University. They predicted that a contemplated broadening of the program will insure the provi-

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sion of governmental aid to all cancer cases.

The cancer program was initiated in October 1949 when it became evident that the increasing public health problem of cancer among Puerto Ricans required an organized official control effort, the speaker stated.

Case Reporting

A statistical registry was established for the recording and analysis of pertinent data from all cancer cases in 72 hospitals. All physicians and hospitals were required by law to report to the Bureau of Cancer Control the details of any case diagnosed as cancer. Now pending are amendments to the law to require such reports from diagnostic and clinical laboratories, they said.

In considering immediately practicable steps to be taken, it was found that Puerto Rico's major difficulty in cancer service was a lack of personnel and facilities for microscopic examination of tissue. Consequently, an expert pathologist was retained to review and recommend solutions for the pathology problem, and additional equipment was provided for the broader functioning of a central pathology laboratory. It was noted that facilities for X-ray diagnosis and therapy also were increased and improved.

Cytology Center

Upon discovery that cancer of the cervix was the most frequently encountered condition, an intensified effort for early diagnosis of this type of cancer was promoted and a cytology center established. The initiation of a cooperative case-finding program for lung cancer produced gratifying results, they noted.

Educational aspects of the program, the Puerto Rican group reported, included distribution of a cancer manual to general practitioners and, in order to obtain uniformity in reporting, a "Manual of Tumor Nomenclature and Coding" to pathologists and hospitals. Weekly

tumor conferences for physicians were held at three major cancer centers and 10-week postgraduate courses, including lectures, clinics and operative demonstrations, were presented weekly in seven local areas by an itinerant instructor. Lectures also were given to ancillary medical groups and to lay organizations with mass education facilities.

At present, they continued, \$75,000 in service contracts for cancer diagnosis and treatment is allotted each year to two hospitals which care for 50 percent of Puerto Rico's cancer patients and an additional \$25,000 a year is divided among 11 other hospitals through a merit system of referral. This had made approximately 1,000 hospital beds available for cancer patients, but it was emphasized that such measures should be considered only as necessary, temporary expedients. They recommended construction in Puerto Rico of a central, government-supported cancer institute, devoted exclusively to the diagnosis and treatment of cancer patients and the investigation and teaching of all aspects of cancer.

Massachusetts Studying 24-Year Cancer Effort

The Massachusetts Department of Public Health has reappraised its cancer control program in a new series of studies on the effects of present day cancer control methods, reported Herbert L. Lombard, M.D., M.P.H., director of its Division of Cancer and Other Chronic Diseases. Cooperating in the study were Barbara Bennett, A.B., Barbara J. Drake, A.B., and Margaret E. Quinn, B.S., assistant biometricians.

The method of calculations and presentation of statistics on therapy used were the recommendations of the subcommittee of the World Health Organization. Records analyzed were those of 4,291 females with breast cancer who attended the

Massachusetts cancer clinics during 1927-50. Cases were classified in age groups, according to site of cancer originally diagnosed, and according to diagnosed or microscopically verified cancer. Dr. Lombard explained. From these data, tables and charts were prepared in all of the classifications for the computed rates of life expectancy for breast cancer admissions and for crude survival. Time period comparisons were made.

Survival Rate

In highlighting some of the findings, Dr. Lombard pointed out that the age-adjusted survival rate, corrected for deaths from causes other than breast cancer, probably gives one of the most representative pictures of the situation. The over-70 age group showed the greatest increase for the 5-, 10-, and 15-year survival periods; credit for this improvement is given to radical operations and better pre- and postoperative treatment. In earlier years, elderly persons with cancer were not usually treated by radical operation; now operations on 80-year-olds are not unusual.

The under 50 years of age group showed the highest percentage of cures as well as a larger percentage of highly malignant tumors. The high percentage of cures may be because the young have profited by their receptiveness to the educational programs in Massachusetts, he said.

Trends in breast cancer survival are upward, concluded Dr. Lombard, but further study is needed to determine all of the causative factors.

Patient, Physician Aided By State Cancer Register

A State-wide cancer record register is of practical value to the medical profession, the individual patient, and the community, as well as the public health worker, experience in Connecticut shows.

These benefits, all intermeshing, were discussed by Matthew H. Griswold, M.D., chief, and Earl S. Pollock, M.A., research statistician, division of cancer and other chronic diseases, Connecticut State Department of Health, before the Public Health Cancer Association.

The register, maintained by the State health department since 1935, contains histories of some 55,000 cancer patients treated in 31 of 36 general hospitals in the State, they reported.

Health Workers

From these histories the medical profession gets information on the extent of the cancer problem, the trends of cancer incidence and prevalence, methods of diagnosis, treatment and results, and survival time, the Connecticut officials indicated. The register also provides a starting point for special clinical investigations, which, in addition to providing valuable information, stimulate interest among the medical profession in evaluating the results of their work with cancer and also tend to improve reporting, they said.

Patients

The patient, in turn, benefits through better care as knowledge and interest in cancer increases, the officials indicated. But more directly, they said, the periodic follow-up system conducted as an integral part of the register assures the patient of adequate attention after treatment. The private patient is followed through the attending physician; the service case, by the tumor clinic. The information obtained for each case is recorded in the local register and forwarded upon request to the central register.

Research

The register is now being used in a study of environmental carcinogens, the officials reported. The records make it possible to select individuals who may have been exposed to carcinogens and to obtain

details of their various occupations. Analysis of the data should point toward specific hazards in specific industries as areas for further investigation, they pointed out.

Socioeconomic Factors In Female Cancer

A correlation between low socioeconomic status and cancer of the stomach was found for women, but not for men, implicating cultural factors as a cause, Edward M. Cohart, M.D., of the Department of Public Health, Yale University, said in reporting on part of a study conducted in New Haven.

The study was undertaken to determine if there was a correlation between cancer sites and socioeconomic status in the United States, as had been found in England and Denmark. A second phase of the study will attempt to trace the biologic factors responsible for the correlation, he said.

Records of 347 cases of stomach cancer in men and 263 cases in women between 1935 and 1948 in New Haven were obtained from the Cancer Register of the Connecticut State Department of Health, supplemented by death certificates. The cases were grouped in seven socioeconomic divisions and, more

broadly, in three socioeconomic regions, he explained.

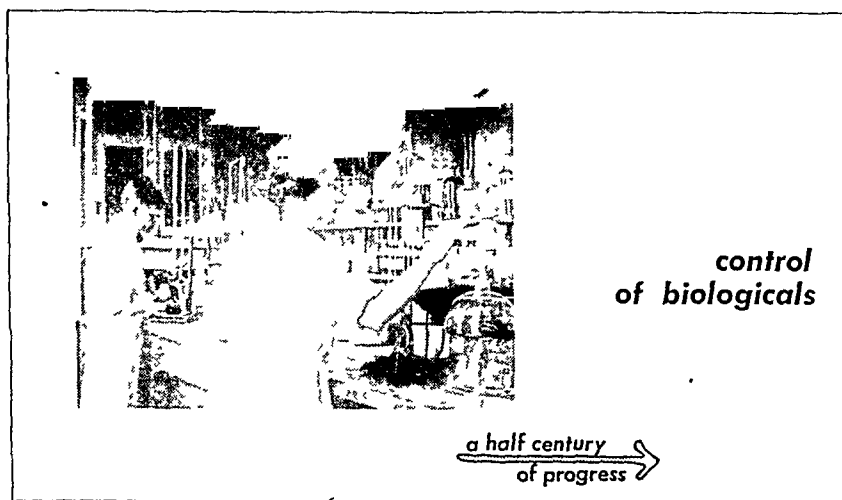
A highly significant excess of observed to expected cases was found among women in the lowest of the three groups. No socioeconomic correlation was evident for men on this basis, Dr. Cohart asserted.

Better Cancer Teaching In Medical Schools

Most medical schools in the country have subscribed to a program of improved cancer teaching, Murray M. Copeland, M.D., director of the oncology department at Georgetown University Medical Center, Washington, D. C., told the Public Health Cancer Association.

The program of coordinated cancer teaching, recommended by the National Advisory Cancer Council, is based on the premise that the family physician is the pivotal figure in cancer control because he has the first opportunity to discover cancer, Dr. Copeland reported. Medical educators have agreed that medical training should offer every physician better opportunity to understand the cancer problem by instruction in early detection and treatment, he said.

Dr. Copeland called attention to the disparity between the proven



good results cancer treatment can give and the less satisfactory cancer statistics actually obtained.

The work of local and national organizations has apparently stimulated more people to recognize cancer symptoms and to seek aid early, he said, with reference to the studies of the Memorial Hospital of New York City on cancer diagnosis delays. The 1946 data showed that in 32 percent of the cases, patients were responsible for delay in diagnosis; in 1923-30 this figure was 44.3 percent. In 1946 the physician was responsible for 27.8 percent of delayed diagnosis, in contrast to 17 percent in 1923-30.

Credits Coordinator

Dr. Copeland credited the "cancer coordinator" with being the one common denominator in the various medical school programs and for gaining for cancer instruction an improved place in curriculums. One main objective, he noted, has been to give students a comprehensive concept of neoplastic diseases by integrating cancer instruction in the general curriculum.

The cancer coordinator has stimulated the internist, surgeon, pathologist, and radiologist to participate in cancer teaching, usually through advisory cancer committees, Dr. Copeland said. He has broadened the concept of cancer as a disease worthy of special attention, urging its distinct, but not necessarily separate, identification, as a public health, therapeutic, and research problem.

The cancer coordinator has also influenced many schools to achieve better cancer facilities and services, he said. Twenty schools had started tumor clinics, and 39 additional schools had expanded or improved their cancer clinics in 1950. Many have enlarged on visual education materials, record systems, and follow-up services. And 31 schools have undertaken clinical research, bringing the departments of medicine more actively into the cancer teaching program, Dr. Copeland concluded.

Cancer Detection Service Aids Preventive Medicine

In fulfilling its main objective of finding cancer cases, a cancer detection center otherwise serves the cause of preventive medicine by discovering many other pathological conditions and referring them for treatment.

Emerson Day, M.D., Thomas G. Rigney, M.D., and Dorothy Fahs Beck, Ph.D., of the department of public health and preventive medicine, Cornell University Medical College, drew this conclusion from analysis of 2,111 initial examinations of adults at the Kips Bay-Yorkville Cancer Detection Center.

The project was set up by the Cornell Medical College and the New York City Department of Health to study the role of cancer detection in adult health services and preventive medicine.

The findings revealed that 27 of the 2,111 examinees had cancer even though the group had been pre-screened to exclude persons with symptoms suggesting malignancy. More than half of the 27 had no symptoms, and were "true detections."

Precaution Rewards

Precancerous neoplasms and other lesions requiring care as a precaution against cancer contributed an average of 14.3 diagnoses for each hundred examinees. Polyps of the colon and rectum constituted the largest component of the precancerous group.

The other pathological conditions found in a presumably well group were about nine times as numerous as cancer and precancerous lesions, and 65 per hundred of these required medical care.

Diagnosis of all types of conditions totaled 3,094, or an average of 1.5 per examinee. Of these, 66 percent were not previously known to the patient. Forty-seven percent of all examinees were referred for

medical care. Four out of five referrals were to private physicians.

Diagnoses Requested

Younger age groups sought the center's services more than did the older, but the latter produced more diagnoses of all types.

The investigators concluded that a cancer detection service diagnoses a small but individually important number of asymptomatic cancer cases and supplies the impetus for the study and treatment of conditions assumed to be precancerous. It detects many other conditions needing attention and initiates corrective measures and early treatment by referral of all types of conditions for medical care.

Suspect Hereditary Factors In Breast Cancer

Common hereditary factors rather than a common environment would be the logical explanation of the fact that breast cancer occurs approximately three times as often in relatives of persons who have had breast cancer than in relatives of those whose family history shows no mammary cancer, Madge T. Macklin, M.D., research associate and lecturer in medicine, Department of Medicine, Ohio State University, told the Public Health Cancer Association.

This does not mean that a woman will have breast cancer because her mother or sister had it, Dr. Macklin went on, but if she does develop the disease it is more likely to be in the breast than in any other organ.

A group of 272 women with breast cancer was interviewed, Dr. Macklin reported, to bring about data leading to these indications. Control groups included 200 women who matched age for age the cancer patients, and a group of 180 patients with cancer other than breast cancer. The study analyzed data obtained from familial histories, correspondence from living relatives, and death certificates and hospital records.

Laboratory and Epidemiological Reports From Overseas

Reports from laboratory investigators and epidemiologists from widely separated areas of the world—Korea, Australia, Costa Rica, Egypt—brought to the APHA meetings observations and data on a variety of diseases infrequently noted in the United States but always potential threats, directly or indirectly.

Salmonella and Shigella Cause Epidemic in Korea

In Korea for the first 5 months of 1951, *Shigella* and *Salmonella* infections were epidemic among the critically ill, starved, and wounded prisoners captured by United Nations forces late in 1950.

Lt. Col. Lorenz E. Zimmerman, MC, USA, Armed Forces Institute of Pathology, Washington, D. C., who was with the 8217th Mobile Laboratory in Pusan at that time, said *Salmonella* infections produced a larger variety of clinical manifestations, and *S. paratyphi* was the predominating *Salmonella* type. Two dramatic manifestations of salmonellosis believed to be rarely, if ever, encountered in the United States were reported by Dr. Zimmerman.

Paratyphoid Ulcers

The first—acute perforation of an ileal ulcer and absence of significant bleeding among patients with paratyphoid fever—occurred in epidemic proportion. Surgical exploration was performed on over 200 patients because of signs of peritonitis incident to intestinal perforation. *S. paratyphi* were consistently recovered in the culture studies that were possible, he said.

Dr. Zimmerman attributed the low incidence of positive results partly to the unavailability of many surgical specimens until 36 hours after operation. He found the paratyphoid ulcers to have certain distinct clinical, bacteriological, and anatomic differences from typhoid ulcers. He continued with the following observations:

Many patients were symptomatic and ambulatory or only mildly ill until the time of perforation. Of 98 with known duration of illness before perforation, only 31 had been sick for more than 6 days. About one-half had denied illness preceding perforation, a striking contrast to perforation of a typhoid ulcer, which usually occurs during the second or third week of illness. Massive gastrointestinal hemorrhage—the complication most feared in typhoid fever—was conspicuously absent. No instance of hemorrhage was found in over 30 autopsies on patients dying of peritonitis or of other manifestations of *Salmonella* infection.

Preliminary investigation established that the perforating paraty-

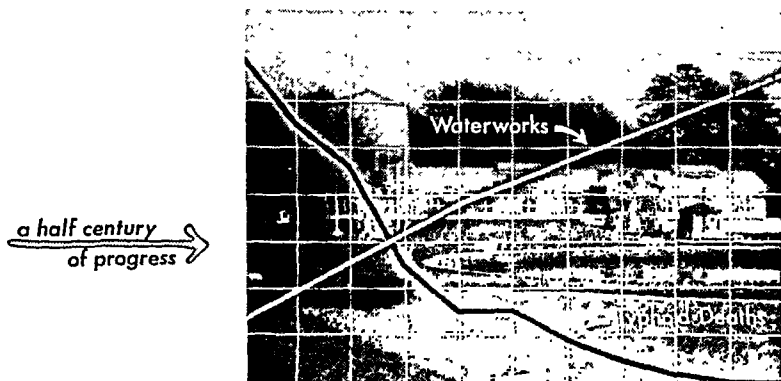
phoid ulcers, like typhoid ulcers, occurred in the lower ileum—73 percent within 30 cm. of the ileocecal valve. Multiple ulcers were more common than single ulcers. On gross examination, paratyphoid ulcers were distinctive and could be differentiated from those of typhoid fever. They were ovoid, usually narrow, often slit-like, and lay transversely between folds of mucous membrane on the antimesenteric border of the ileum. Some were shallow, involving only the surface mucosa, while others penetrated deeply, causing perforation. They were often more easily located by exploration for evidence of peritoneal action.

Salmonella Septicemia

The other unexpected clinical manifestation of especial epidemiological significance was demonstrated in the cases of two patients who, though treated successfully for relapsing fever with meparsen, succumbed to a concurrent *Salmonella enteritidis* septicemia. *Borrelia* could not be demonstrated, but *S. enteritidis* was recovered, on autopsy, from the blood, urine, bile, and spleen of the first, and from the blood and spleen of the second. The second case also revealed an acute bacterial endocarditis.

In the great European epidemic of 1920–22, mortality rates from *Salmonella* septicemia in relapsing fever

municipal sanitation



reached 63 percent. Abscesses, gangrene, chondritis, osteomyelitis, arthritis, and thrombophlebitis occurred in as high as 13.8 percent of the typhus and 3.4 percent of the relapsing fever cases. The 1937 findings of P. Y. Liu, S. H. Zia, and H. L. Chung showed that body lice obtained from patients indicated that *Salmonella* infection should be added to the list of louse-borne diseases.

It is important, Dr. Zimmerman felt, that the clinician recognize the therapeutic implications of the two concurrent infections since experience in Korea has shown chloramphenicol to be of value in both *Salmonella* and *Borrelia* infections.

By May 1951, most prisoners had been taught the basic elements of sanitary discipline; the malnourished had been well fed; and the wounded were recovering. These factors, combined with many others, brought the once serious epidemic under control.

Infect Australian Rabbits With Myxoma Virus

"In October 1951 I spent a night in a country hotel in northern Victoria and was intrigued to read a notice in the bar: 'An officer of the Lands Department will attend at the stockyards on Tuesday next to inoculate rabbits with myxomatosis. Landowners should bring 10-20 live rabbits.' That sort of thing went on over most of Australia," Sir F. MacFarlane Burnet, M.D., director of the Walter and Eliza Hall Institute of Research, Royal Melbourne Hospital in Victoria, Australia, told APHA epidemiologists.

Sir MacFarlane outlined the rabbit's significance to Australia before telling the epidemiology story of the dissemination of myxomatosis virus to effect biological control of the animal.

"Our rabbit is the European species that is found wild in England and is the ancestor of all the breeds of laboratory rabbits," he said. In-

roduced by homesick colonists around 1860, it spread from Victoria and New South Wales until rabbit colonization of the land was completed about 1930. Between 1 and 3 billion rabbits flourish in all the settled country below the tropics, spreading to arid areas according to seasonal conditions. Ten rabbits consume as much pasture as one sheep—a conservative estimate.

Elimination a Necessity

"The elimination of the rabbit would be by far the most effective single step to increase food and wool production," he stressed. The rabbit destroys natural vegetation in the marginal zone, causing wind erosion and sand drift. Once rabbits were recognized as serious pests, rewards were open for ways of exterminating them.

The Australian physician mentioned Pasteur's interest in the 1880's when the latter sent one of his men to Australia with *Pasteurella* cultures, but owing to the understandable skepticism of government officials he was not allowed to liberate the cultures. The possible use of myxoma virus was mentioned at various times, Sir MacFarlane said, and the first objective experiments dealing with Australian rabbits began in England in 1934. Investigations were moved to Australia when it became apparent that myxomatosis had no significant power to infect any other common animal.

It took 15 years more before the virus was effectively liberated, he said, because of "the rather illogical aversion of health authorities to allow field studies of the virus in any but sparsely populated areas, and the failure to grasp the importance of mosquito vectors for the spread of the disease."

Mosquitoes Are Vectors

In prewar field tests, one on an island off the South Australian coast, another in a dry inland area, he reported, "mosquitoes were inconspicuous or absent, and only a very

limited spread of the virus occurred."

When experiments were resumed in 1950, tests were made in higher rainfall zones in eastern Australia. Infection was mainly by contact, it was believed. Tests were made in the autumn, winter, and spring, but only a few local infections were observed.

Uncertainty existed as to how the virus spread in nature. The Australians had missed Aragao's work in 1942 on the natural history of myxomatosis in Brazil, and the realization that effective spread in Australia needed mosquito carriage came as a surprise.

In November 1950, Sir MacFarlane continued, the testing team was prepared to report a fruitless experiment. Then, word came in early December that rabbits were dying by hundreds along the Murray River flats near Balldale, where the liberations had been made. "This was front-page news for Australia, and everyone in the country was on the lookout for sick rabbits." The disease spread rapidly across New South Wales, reaching southern Queensland in 3 to 4 months—by the end of the Australian summer.

Evidence pointed to *Culex annulirostris* as the important vector. According to Sir MacFarlane, this very common mosquito breeds in shallow water at the edges of streams and in temporarily flooded regions. "It has a restricted flight range," he explained, "rarely moving as far as half a mile from its breeding place. The cross-country leaps of a thousand miles in 3 months could not have been due to this species, and there are a number of rival hypotheses to account for it—*Aedes theobaldi*, wind, human transport of mosquitoes in vehicles of one sort or another."

Inoculations

Commenting on the artificial dissemination of the virus, Sir MacFarlane said: "It is hard to be sure that the inoculations made any significant difference to the result."

The following summer, one with normal rainfall, saw the development of *Anopheles annulipes* as another important vector.

The virus investigations of Frank John Fenner, M.D., and his Melbourne colleagues may have general epidemiological significance, the speaker said. Studies show that myxomatosis is a member of the pox virus group. Field observations confirmed that vectors of myxomatosis need not be specific. The mosquito becomes infective for rabbits only by feeding through myxomatous lesions of the skin, resulting in mechanical contamination of the insect's mouth parts, and transfer to other rabbits is through a local lesion in the skin, not by injection of infected saliva into the blood. Any biting or sucking arthropod which feeds through the skin should serve. The role of the mosquito is merely that of a "flying pin," a phrase coined when Dr. Fenner discovered he could closely parallel his findings with mosquitoes by using an entomological pin pricked with a myxoma lesion.

"In myxomatosis, now by human action enzootic among Australian rabbits, we have a unique opportunity to watch a 'new' disease," Sir MacFarlane concluded. "I shall be surprised if the results do not eventually help us greatly in understanding some aspects of the past and present behavior of infectious disease in man."

Antibody Patterns Higher In Egypt Than Miami

Most Egyptian natives develop poliomyelitis antibodies in infancy and early childhood in contrast to the much slower and later antibody development found in Miami, Fla., residents.

This geographic and socioeconomic antibody pattern, possibly attributable to differences in living conditions, were reported by S. J. Liao, M.D., J. L. Melnick, Ph.D., and

J. R. Paul, M.D., of the section of preventive medicine, Yale University School of Medicine.

More than 60 percent of the infants tested in Cairo, Egypt, showed evidence of maternal antibody in the first 6 months of life, the investigators found. They lost this evidence of immunity during the second 6 months and reacquired it at the age of about 18 months. By age 5 most Cairo children had appreciable amounts of antibody.

Similar Patterns Found

A similar antibody pattern for poliomyelitis was found in the other crowded and low sanitation areas of Havana, Cuba, and the Latin-American areas in the Lower Rio Grande Valley of Texas, the investigators reported.

Serologic tests on Miami residents presented a different picture, they said. While about 40 percent of the newborn infants tested had poliomyelitis antibody, only 10 percent had reacquired the antibody at ages 5 to 9 years. The increase was slow: 50 percent had developed antibody at 5 to 9 years, and more than 80 percent in their 20's.

A child of 2 years in Cairo has an antibody development equivalent to that of a 15-year-old in Miami, the investigators stated.

They reported less marked differ-

ence in the Cairo and Miami antibody pattern for mumps. In both populations the proportion of persons with positive complement fixation tests rose rather slowly in the younger age groups. And in both areas, only 75 percent of the adult population was positive. This level of immunity to mumps was reached by 10 years of age in Cairo and by 15 years in Miami, they said.

Epidemic Hemorrhagic Fever Studied by Army

Epidemic hemorrhagic fever was first experienced by Americans last year in Korea, where it is now under intensive Army study, commented Joseph E. Smadel, M.D., chief of the department of virus and rickettsial diseases, Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D. C.

A "place" disease—not a contagious disease—and unknown to Korea prior to this time, epidemic hemorrhagic fever was the subject of Japanese and Russian studies in Manchuria and Siberia during the last two decades, Dr. Smadel said in reviewing the etiology and epidemiology of the disease.

"There were approximately 1,000 cases of this disease during 1951 and about 700 cases since then. Such

the attack on nutritional diseases



a half century
of progress →

an incidence of a serious disease always constitutes an important military problem," he stated.

Dr. Smadel reviewed the information on the disease which has been accumulated in a brief time. He described the epidemic area in Korea as a belt extending across the peninsula from Seoul to the present main line of resistance, with sharply defined foci in rural areas. "Most cases occur as isolated events, but small outbreaks are encountered which appear to result from almost simultaneous infection of the members of the group," he said.

Etiological Agent

According to Dr. Smadel, both the Japanese and Russian scientists believed that the etiological agent was maintained in nature through a cycle involving rodents and arthropods, but the two groups were inclined to incriminate different rodents and different arthropods.

The American studies during the past summer produced similar opinions regarding rodents and arthropods. Their findings, however, pointed to trombiculid mites as the likely vectors, he said, adding that this general group of mites provides the vector for scrub typhus, another classic example of a "place" disease.

Dr. Smadel emphasized that definitive information on the mode of transmitting epidemic hemorrhagic fever to man and the natural cycle of the disease in rodents and arthropods will not be obtained until the agent can be readily handled in the laboratory and used in crucial tests.

There are many lines of investigation which hinge upon the theoretically simple procedure of finding a suitable laboratory host for the agent, he said. Both the Russian and Japanese researchers demonstrated that the disease agent was filterable and could be transmitted from man to man by inoculation of body fluids obtained during the first few days of the febrile illness, but were not able to establish and maintain the agent in a common laboratory animal.

"Since the disease was first encountered among United Nations troops, extensive and laborious efforts have been made to find the answer to the crucial question of a suitable laboratory host," Dr. Smadel reported, adding that as yet these efforts were not successful.

Wild Birds May Carry Encephalitis Virus

The hypothesis that the appearance of the encephalitis virus in temperate regions during the summer may be due to bird migrations, was presented by Sir F. MacFarlane Burnet, M.D., of the Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia.

In discussing Murray Valley encephalitis, the speaker compared four severe epidemics which occurred in Australia during the years 1917, 1918, 1925, and 1951. He said studies indicate that the epidemics occurring in Australia differ only in detail from the epidemics of Kern County, Calif., and Yakima, Wash.

"What I have in mind is the possibility that persistence of these viruses in nature is confined to tropical or near tropical areas where mosquitoes capable of transmitting the virus are present all year," he said. Then, he depicted a bird in the stage of transient viraemia moving toward a temperate region, being bitten by and thus infecting several mosquitoes, which a week later infect another migrating susceptible bird. The second bird, continuing its flight, develops viraemia a hundred miles further away from the tropic and initiates another focus of infected mosquitoes. The presence of nesting birds in any locality so infected would soon build up a high infective potential.

"This is at present speculation, but it does provide a working hypothesis to account for the main features of the disease as seen in Australia, and just possibly, it may be

equally applicable to conditions in other parts of the world," Dr. Burnet said.

Serologic Survey

The findings of an extensive serologic survey in the epidemic area of the Murray-Darling River Basin led to Sir MacFarlane's hypothesis. In the summer of 1951 a large proportion of the population, the horses, dogs, domestic fowl, and wild birds, particularly water birds, showed serologic evidence of encephalitis infection. In 1952, the virus had vanished from the area, the speaker said.

Conditions in the area did not permit the virus to survive over winter, Sir MacFarlane concluded. He surmised that encephalitis "is not endemic in the Murray Valley, but reaches it from some other region only when climatic and ecological conditions are appropriate."

The abnormally heavy rainfall over the subtropical headwaters of the Darling River that preceded each epidemic in the area supplied a possible clue to the differences in the seasonal variations of encephalitis in the regions further north since the infection is common in tropical Australia.

While it has not been proved that Murray Valley encephalitis is spread by mosquitoes, Sir MacFarlane said, circumstantial evidence implicates as the principal vector the *Culex annulirostris*, a river bottom mosquito that feeds freely on water birds and rabbits, and indicates that wild birds are the main vertebrate host of the MVE virus.

A Barrier Zone Required For Sylvan Yellow Fever

The only hope of arresting the progress of sylvan yellow fever in Central America is to establish a barrier zone with effective insecticides and adequate control studies in a small terrain funnel between the

present location of the disease and its future zones of activity. Whatever the results, "we shall have learned much more for having made the effort, but if no attempt is made to establish this barrier zone . . . the grim mechanism will continue to advance unchallenged . . . and we shall remain merely the spectators in a great drama of our era." So Col. Norman W. Elton, MC, USA, director of the board of health laboratory, Health Bureau, Canal Zone Government, Ancon, C. Z., reported.

Pattern of Progress

Continuing his reports made earlier this year (one of which was published in the May issue of *Public Health Reports*), Colonel Elton made the following points:

In Central America the current sylvan yellow fever wave will move steadily northward through Nicaragua and Honduras and then north and west.

To deal with the disease effectively and to prevent needless confusion, a concerted effort has been made to determine its progress pattern and to maintain close contact with its activity. The wave has progressed approximately 13 miles per month although this might increase to 100 miles, he said, and incompletely controlled epidemic centers remain active up to about 2 months.

Types of Barriers

Open, deforested country and regions of minimal precipitation are barriers to the spread of yellow fever. The continental divide is not in itself a natural barrier. It was effective in Panama, west of the Canal Zone, but in Costa Rica, although higher than in Panama, it has been crossed in two localities. Further study is needed of the significance of rain forest continuity across the divide, similarities and differences in rainfall on the two sides, migrant farmers, and the various species of *Haemagogus* mosquitoes other than *spegazzinii* falco, as well as other canopy mosquitoes, as possible vectors at higher altitudes.

Working Links Between Hospital, Private, State Laboratories

Relationships between State public health laboratories and private and hospital laboratories were variously described as consultation, reference, evaluation, regulation, stimulation during a panel discussion sponsored by the Conference of State and Provincial Public Health Laboratory Directors. Reports were heard from three State laboratories, a private laboratory, and a hospital laboratory.

Because of rapid and continuing advances in the medical sciences, he continued, laboratory services and requirements are becoming increasingly technical and complex. As an example he cited the 125 determinations now commonly performed by various Pennsylvania laboratories.

In urging an integrated laboratory program which he felt would best serve the public interest, Dr. Dickman warned that delays in stabilizing the laboratory profession complicate an already serious situation and stressed the need for cooperation among three main laboratory groups.

State Interest Encourages Private Laboratories

State departments of health should supervise, evaluate, regulate, and stimulate the expansion of privately operated laboratories in order to promote laboratory services which are uniformly ethical, adequate, and accurate, declared Albert Dickman, Ph.D., director of the Dickman Laboratories in Philadelphia, in the panel discussion.

Three Main Groups

First, the analytical-biochemical-biological laboratories, offering to the medical profession analytical services exclusively; second, the pathologist-directed clinico-pathological laboratories, handling customary requests and referrals from the analytical laboratories and offering to the medical profession additional consultation, interpretation and diagnosis; and third, the public health

serology and chemotherapy

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a half century
of progress →



and reference laboratories, offering services for the indigent, analytical procedures beyond the scope of the other laboratories, and dealing primarily with the laboratory aspects of communicable disease and broad public health problems.

Dr. Dickman felt that a clear differentiation of the analytical-biochemical-biological laboratories and the clinico-pathological laboratories would eliminate the obstructions which in the past have prevented a cooperative solution of many laboratory problems.

He said that during the first 10 months of State health department supervision and licensing of laboratories in Pennsylvania—exclusive of hospital, governmental, and physicians' laboratories—many of the laboratories enlarged their accommodations, others installed new and modern equipment, and many directors attended meetings specifically arranged for study, discussion, and demonstration of modern procedures. Also, many were stimulated to initiate their own periodic evaluations of their services in anticipation of those to follow from the State.

Dr. Dickman expressed the hope that eventually the State department of health laboratory can become an educational institution for all the laboratories of the State, training suitable personnel, providing proper evaluation of techniques, and assisting in obtaining materials and reagents of adequate purity and reliability.

Consultation, Reference, Evaluation in California

The working relationship between the State public health laboratory and local clinical laboratories in California has become one of consultation, reference, and evaluation, Howard L. Bodily, Ph.D., acting chief of the division of laboratories, California Department of Public Health, told the Conference of State

and Provincial Public Health Laboratory Directors.

This relationship began in 1927, he said, when laboratory technicians began a voluntary certification program in cooperation with the State health department. The clinical laboratory law, passed in 1938, provided for licensure of laboratory technicians and nonmedical laboratory directors, or technologists, he continued. It prohibited performance of laboratory tests by anyone except technicians, technologists, and physicians or surgeons licensed in California, and limited direction of laboratories to licensed technologists and California licensed physicians and surgeons.

The State board of health, through the division of laboratories of the health department and two advisory committees, administers this law. It was recently amended to require a permit to operate a laboratory, as well as approval of laboratories and schools which train technicians, Dr. Bodily stated.

In addition to the two major committees, special committees assist in determining the part to be taken by the State public health laboratory in Rh determination, and in blood bank and similar activities, he said.

Administrative Links "Making Us Friends"

The administrative relationship between the bureau of laboratories of the Pennsylvania Department of Health and the hospital and private laboratories has "made us acquainted" and the service relationship "is making us friends," C. J. Gentzkow, M.D., director of the bureau, told the panel.

The administrative relationship originates in the laws and in the regulations issued under them, such as the law requiring premarital and prenatal serologic tests for syphilis (STS), said Dr. Gentzkow. Applications of laboratories for approval are reviewed by the health depart-

ment and the Advisory Committee on Laboratory Procedures. If the application is approved, serum specimens are sent to the laboratory and its performance is evaluated from the results of the tests. Quality of performance is evaluated regularly.

The value of the relationship under this act is evidenced by the general improvement in performance of the STS in approved laboratories, Dr. Gentzkow reported. Failures to turn in a satisfactory performance have decreased from 23 percent in 1950 to 9 percent in 1952. "Our laboratories feel free to call on us for assistance at any time," he said.

The passage of the so-called Analytical-Biochemical-Biological Laboratory Act in 1951 brought about a new administrative relationship between State laboratories and "certain laboratories making examinations of materials originating in the human body," Dr. Gentzkow continued. The act makes provision for the department of health to investigate and inspect laboratories, to deny permits, and to revoke permits previously issued. "We are now getting acquainted with some 60-odd laboratories for the first time," Dr. Gentzkow reported. Contacts have been established which will lead to service-type relationships.

Service

The second relationship is one of mutual service, according to Dr. Gentzkow. The State laboratory works beyond the scope of local laboratories, and in turn can refer to the Communicable Disease Center and National Institutes of Health laboratories of the Public Health Service, as well as to the various departments of the University of Pennsylvania and its graduate school and to the Armed Forces Institute of Pathology.

Technical personnel from hospital and private laboratories are given refresher training for varying periods. Laboratory personnel from the entire State participated in one recent conference at the Pennsylvania State College, he said.

Laboratories throughout the State study reports of methodology advances and also carry on their own studies. "When improvements in techniques or new methods have been studied and prove worth while, they are made available to all our laboratories," said Dr. Gentzkow. Hospital and private laboratories in turn report anything new and promising that they may discover. "These service relationships . . . are growing. All of us are becoming increasingly aware of the fact . . . we are mutually interdependent."

Comparative Proficiency Ratings Use Suggested

State public health laboratories should function as reference laboratories for private and hospital laboratories, J. V. Irons, Sc.D., director of laboratories, Texas State Department of Health, told the conference of Laboratory Directors.

They provide services useful in the prevention, recognition, and control of communicable diseases of public health importance, he noted. Nearly all perform bacteriological and serologic tests; most offer sanitary bacteriology and chemistry services; but few offer extensive diagnostic services in either medical mycology or virology. They do not generally perform clinical laboratory tests, which are the primary concern of the private and hospital laboratories. There is a growing need, he said, for the State laboratories to add some clinical tests "to meet the challenge of chronic diseases and diseases of old age."

In addition, the State laboratories should provide opportunities for refresher or specialized training of qualified personnel from private and hospital laboratories. They can also inspire confidence in the work of the private and hospital laboratories by evaluation of their services. He recommended the use of comparative proficiency ratings to detect deficiencies.

Prevention of Poliomyelitis With Gamma Globulin and Vaccine

Two advances in the search for preventive measures against poliomyelitis were reported at the Cleveland APIA meeting. William McD. Hammon, M.D., Dr. P.H., professor of epidemiology of the University of Pittsburgh Graduate School of Public Health, gave preliminary results of mass gamma globulin trials. Howard A. Howe, M.D., adjunct professor of epidemiology at the Johns Hopkins University School of Hygiene and Public Health, reported on use of a killed virus vaccine in six children.

through the fifth week, at least, Dr. Hammon reported.

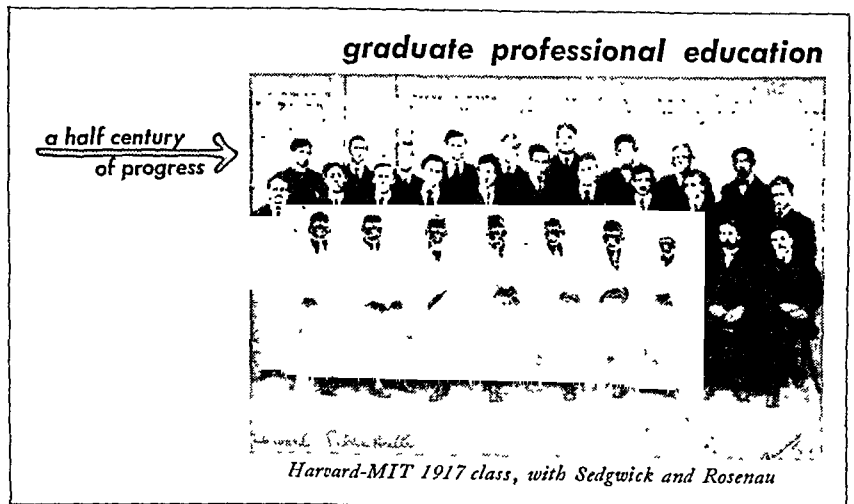
The tests took place during epidemic outbreaks in Provo, Utah (September 1951), and in Houston, Tex., and Sioux City, Iowa (July 1952). The gamma globulin was processed from blood collected during World War II by the American National Red Cross and contained in approximately equal amounts antibodies against Brunhilde, Lansing, and Leon types.

Preliminary findings based on clinical diagnoses were summarized by Dr. Hammon as follows:

" . . . 54,772 children between the ages of 1 and 11 years were inoculated, one-half of them with gamma globulin and one-half with a solution of gelatin. These three field tests were conducted in areas that were experiencing severe epidemics of poliomyelitis. The injections were given to apparently normal, healthy children living in the area, with the full understanding, permission, and cooperation of the parents. Which of the two materials any one child had received was unknown to all—

Report Marked Protection In Gamma Globulin Test

Field tests involving some 55,000 children in 3 epidemic areas indicates that injections of gamma globulin containing antibodies against the 3 known poliomyelitis viruses gave marked protection that lasted



children, parents, and investigators—until completion of a follow-up period considered to be adequate for determining a final diagnosis.

Protection Demonstrated

"A preliminary tabulation of results as of October 1, 1952, shows that paralytic poliomyelitis had been diagnosed in 90 cases in the study groups. Analysis of these patients on the basis of the type of injection received shows that significant protection was conferred by the gamma globulin. During the first week after injection there was no significant reduction in the number of cases in the group receiving gamma globulin, but the severity of paralysis appears to have been modified. From the second through the fifth weeks highly significant protection was demonstrated. After the fifth week this was less evident, but more definite conclusions regarding the duration of the protection and possible modification of disease should be available after a longer period of follow-up. Laboratory studies, still incomplete, should give information regarding the effect of gamma globulin on inapparent infection and the subsequent development of active immunity."

The report—from which the above is taken—was read before the epidemiology and laboratory sections on October 22. Together with two other papers, one giving the plan of controlled field tests and the results of the 1951 pilot study in Utah, and the other outlining the conduct and early follow-up of the 1952 Texas and Iowa-Nebraska studies, it was published in full in the *Journal of the American Medical Association* for October 25, 1952, pages 739-760.

In Trial Stage

Looking ahead, Dr. Hammon said that "if it is found that gamma globulin has not interfered with inapparent infection and the development of active immunity during the period of protection against clinical disease, this agent will have a wide field of usefulness, at least until a

more effective and equally safe means of prevention has been developed."

"The present supply of the blood fraction suitable for poliomyelitis prevention use is extremely limited and completely inadequate to meet expected needs," Dr. Hammon said. Since World War II, he pointed out, there has been a sharp decline in public blood donations. However, he noted, the most heartening aspect of the situation is the willingness of the public to cooperate in the solution of a public health problem, as demonstrated by their participation in the field trials.

Associated with Dr. Hammon in the conduct of the field studies and as co-authors of the reports were Dr. Lewis L. Coriell of the Camden (N. J.) Municipal Hospital, Dr. Paul F. Wehrle of the U. S. Public Health Service, Dr. Christian R. Klimt, fellow of the Rockefeller Foundation, and Dr. Joseph Stokes, Jr., of the Children's Hospital in Philadelphia and of the University of Pennsylvania. The work was supported by the National Foundation for Infantile Paralysis.

Six Children Respond To Polio Vaccine

A satisfactory antibody in humans to killed poliomyelitis virus was reported by Dr. Howe in an exhibit at the meeting. Tests of six children in Baltimore showed antibody levels to the Lansing, Leon, and Brunhilde viruses comparable to levels found in vaccinated laboratory chimpanzees.

The vaccine, prepared from formalin-treated virus, is the result of studies over nearly 10 years on monkeys and chimpanzees which have shown conclusively that it is possible to immunize the animals against all types of the disease even when they are "challenged" by injection of active virus directly into the brain.

The children tested were between 2 and 5 years of age. All are inmates of the Rosewood Training School, a Maryland state-operated institution for the mentally retarded. They were chosen for the study because of their isolation from most outside contacts and the fact that they could be kept under continuous observation. Five ward mates of the children under study were not vaccinated and served as controls.

Written permission was obtained from the parents or guardian of each child for the studies, which were conducted with the cooperation of physicians and officials of the Maryland Department of Mental Hygiene.

Although Dr. Howe expressed his satisfaction with the results of the tests, he cautioned that the vaccine used is experimental and that more extensive laboratory work would be necessary before an effective and practical vaccine could be made available for general use.

Many Unknowns

There are many "unknowns" still to be determined, he pointed out, and, undoubtedly, the present vaccine will undergo changes before it can be used on a large scale.

Such factors as exact amounts of antibody necessary to immunize, the length of time immunization levels remain effective, the elimination of substances in the vaccine which might cause side reactions, and new methods for growing the active virus on a large scale must be worked out in the laboratory, he declared.

The human immunization tests were made during the summer and fall of 1951. Blood samples from the six children were taken on June 26, 1951, and the first dose of vaccine administered by intramuscular injection the following day. Only a very small amount of vaccine was given. As an extra precaution, gamma globulin, a human blood derivative which provides a passive or short-term immunization and prevents paralysis by destroying active virus in the blood stream, was given at the same time.

Antibody Response

Fifteen weeks later a second and smaller "booster" injection of the vaccine was given. Blood tests to determine the antibody response were made at regular intervals over 6 months.

Response to the Lansing and Leon varieties of the disease was the highest, while that to the Brunhilde strain was poor. Nevertheless, the reaction of two children to the latter type was definite and consistent with the responses to the other types. This same finding was recorded also in the tests on chimpanzees, and Dr. Howe expressed confidence that a larger quantity of the vaccine would produce higher levels of response.

At no time have any of the children shown any apparent discomfort or any untoward local reaction to the vaccine. The children will be followed closely for an indefinite period to determine how long detectable antibody will remain. The work was supported by the National Foundation for Infantile Paralysis.

Polio Follow-Up Program Revised in New York

Periodic evaluation of long-term follow-up of poliomyelitis patients—and for other similar programs—results in more efficient and more economical operations and frequently in radical changes in focus and procedures, reported Helen M. Wallace, M.D., director of the bureau for handicapped children, Patricia Heely, R.N., director of the bureau of nursing, and Herbert Rich, senior statistician, all of the New York City Department of Health; and Margaret A. Losty, R.N., director of nursing service for the National Foundation for Infantile Paralysis.

Follow-up Care Analysis

They made an analysis of the follow-up care given to 1,523 poliomyelitis patients during 1949 in New York City. The program studied

had been set up in the 1940's and provided for a 2-year period of home visiting by public health nurses. The plan represented an agreement of opinions of medical leaders in the field, members of the health department, and the voluntary nursing agencies.

Analysis of the plan as it operated in 1949 revealed:

1. The same amount of home nursing supervision was given to the nonparalytic, and the bulbar and other paralytic types of patients.
2. The same amount of home nursing supervision for the period of follow-up was given to all patients regardless of their medical status at 3 months after onset of illness.
3. 1,200 or 10 percent of the home visits were made after the patient had been discharged medically.
4. Fifty-two percent of the nonparalytic school age children who might have been followed through the school health service were not seen by that service.
5. Other examples of wasted home visits were the multiple visits made while the patient was hospitalized or away at school.
6. In only 4 percent of the patients a subsequent or new paralysis was detected; almost all of these patients were under continuous and competent medical care.
7. In one-half of the nonparalytic group subsequent paralysis was de-

tected within 3 months after onset; one-third of the paralytic group developed new paralysis within 1 year after onset.

8. One-half of the paralytic patients under private medical care did not receive such care from a qualified specialist.

9. There is some evidence that physical therapy was continued beyond the period when it is usually considered productive.

Wallace and her colleagues observed that "had the data obtained through this study been available in 1949, and the follow-up plan revised accordingly, approximately 8,350 of the 12,437 public health nursing visits actually made by health department nurses alone might have been saved and made available for other patients."

Priorities Set

Priorities, the authors felt, must be established, and they suggested that these "would logically seem to be: the nonbulbar paralytic group; the bulbar paralytic group; and the nonparalytic group. Patients who are homebound because of paralysis should receive high priority. Existing programs, such as the school health and child health services, should be used to their maximum for follow-up of patients, rather than superimposing another service."

the health department in field and laboratory

a half century
of progress



As a result of this study, the follow-up program has been revised, Dr. Wallace reported. A guide for visiting has been set up. The number and frequency of home visits will be based on the needs of the patient and his family, and will be determined by the public health nurse in consultation with the patient's physician. The nurse, of course, may call upon her supervisor and consultants in the field for guidance. The suggested priorities are established, the New York group said, and included is the principle of use of existing school health and child health services. It is recommended that nonparalytic patients generally be visited for a 3-month period, and paralytic patients for 1 year.

Wallace and colleagues reviewed, also, problems of referral to special-

ists, interchange of information between hospitals and community nursing services, and physical therapy. They pointed out that while this study resulted in revisions, "it should not be taken for granted that this . . . is the final answer. Undoubtedly, periodic reevaluations will result in further modifications." They reported that a similar study is under way concerning follow-up of children with cardiac handicaps.

Polio and Rabies Viruses Show No Cross Immunity

Contrary to recent news reports that rabies vaccination may protect man from poliomyelitis are the recent findings of two scientists from the medical research institute connected with the Michael Reese Hos-

pital in Chicago. In a series of three experiments using 200 Swiss mice, no evidence of cross immunity was found between the poliomyelitis virus and the rabies virus by Albert Milzer, M.D., and Freddie Nicholson, B.S.

Dr. Milzer, chief of the microbiology department of the institute, reported that immune Lansing anti-serum failed to neutralize the rabies virus, and hyperimmune rabies anti-serum did not neutralize the Lansing virus. In every experiment the vaccine or hyperimmune serum tested showed significant protection against homologous virus.

The researchers warned that rabies virus has the possible hazard of producing allergic encephalomyelitis in vaccinated individuals and that its use should be restricted to proven indications.

New Methods and Approaches In Laboratory Techniques

Laboratory procedures have been made easier by the achievements of research bacteriologists in Baltimore, in the Public Health Service Communicable Disease Center, and in the Chemical Corps at Camp Detrick.

The laboratory section heard reports covering recent studies on the re-use of streptococcus cells, population changes in Brucella cultures, the virulence of Corynebacterium diphtheriae, and the use of Clostridium sporogenes to indicate sterility in laboratory instruments.

Virulence Induced in Avirulent Bacilli

Additional data on the effect of bacteriophage to virulence in *Corynebacterium diphtheriae* were reported by Elizabeth I. Parsons, Sc.D., bacteriologist, Communicable Disease Center, Public Health Service, and Martin Frobisher, Sc.D.,

head of the bacteriology department, University of Georgia.

Reviewing literature, they noted that several investigators have shown that toxigenic strains of *C. diphtheriae* from cultures of avirulent *C. diphtheriae* developed from contact or infection with specific bacteriophage, repudiating the earlier theory that avirulent strains never acquire virulence.

Findings

Following a description of methods and materials used at the communicable Disease Center in studying this problem, they summarized the findings:

The activity of a given phage of some strains of diphtheria bacilli may be increased from 10 or 100 up to 10,000 or even 100,000.

Of 37 strains of avirulent *C. diphtheriae* so far tested, the change to virulence has been induced in only six, using six different bacteriophages for each culture.

Virulence may be induced in a given strain by one phage but not by another.

Although two phages specific for, and propagated continuously on, virulent, gravis-type *C. diphtheriae* have been among the six phages used in these studies, no avirulent gravis strain has acquired virulence as a result of phage action.

The change of virulence has so far been induced only in mitislike strains, in spite of as many as 50 culture-to-culture passages with some avirulent strains.

What appeared to be bacteria-free bacteriophage suspensions yielded typical virulence tests in rabbits. The reactions seemed to be due to toxin, but origin of the toxin is not clear.

New Washing Method Permits Cell Re-use

A procedure for reclaiming and reusing bacterial cells employed for adsorption of antibody in the production of streptococcus typing serums has been devised by Elaine L. Updyke, Sc.D., and Elizabeth Conroy, M.S., bacteriologists with the Communicable Disease Center, Public Health Service.

The large volumes of broth cultures that must be handled to obtain enough streptococcus cells for the adsorption process make it advantageous to use the same cells repeatedly, the bacteriologists explained.

The packed cells are reclaimed after use by suspension in 4 to 5 volumes of N/5 HCl in physiological saline and overnight refrigeration at 4° to 10° C. The acid-cell suspension is centrifuged and the cells washed three times in 4 to 5 volumes of physiological saline. The second saline suspension is adjusted to pH 7.0-7.2 with N/1 NaOH. Cells receiving this treatment have been satisfactory for as many as eight adsorptions, they reported.

Practical Technique

Resuspension of the tightly packed cells for the acid and saline washes is facilitated by a midget household electric mixer, the blade of which fits easily into a 50-ml. centrifuge tube. The mixer blade is transferred from tube to tube after a tap water rinse, and 20 specimens can be suspended in the time previously required for 1.

This technique, the bacteriologists said, has proved practical in routine use and was adopted without further study to ease the laboratory work-

load. It takes less time and labor than the growth and collection of fresh cells, even with a Sharpless centrifuge available, they found.

Other workers, they suggested, may want to investigate the procedure further—to study the efficacy of other concentrations of HCl, of other acids, of alkalis, or of high salt concentrations, and to determine the optimum time of all exposures to acid and the length of refrigeration. Possibly, they concluded this technique can be adapted to other bacterial antigen-antibody systems.

Better Procedures for Culture Recognition

A variety of environmental conditions capable of modifying metabolite production can affect population changes in *Brucella* cultures, both quantitatively and qualitatively, and better recognition of them can assist in improving routine laboratory procedures, asserted Werner Braun, Ph.D., and Robert J. Goodlow, Ph.D., of the Chemical Corps Biological Laboratories, Camp Detrick, Frederick, Md.

Pertinent Data

In reviewing the problem of stabilizing *Brucella* cultures, the bacteriologists stressed the recognition

of alanine and valine as two naturally produced amino acids which can selectively enhance the establishment of cells with different antigenicity, immunogenicity, and virulence. Pertinent in vitro data and their evaluated relationship to some problems of routine laboratory procedures were outlined as follows:

The degree of heterogeneity in heterogeneous cultures should be ascertained whenever possible and every effort made to start new cultures with a homogeneous inoculum. Colonial morphology is a helpful indicator of antigenicity and virulence.

Cultures should be incubated as briefly and transfers made as infrequently as possible since population changes are likely to occur during any period of growth.

Solid media are preferable to liquid media for maintaining stock cultures. The inhibitory effects of metabolites and the effects upon population changes are far less pronounced on solid media.

Transfers from single colonies of cells with the desired characteristics are preferable to mass transfers. Single colony isolates tend to promote the maintenance of homogeneous cultures since it is more likely that even a small proportion of mutant cells in the parent culture would be excluded in transfers from single colonies. Conversely, they might carry over such mutant cells,

the nurse's home visit and rural sanitation

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thus preserving existing heterogeneity by giving the cells opportunity for further establishment.

The recognition of the role of the substrate in the production of selectively inhibitory amino acids and the discovery that with alanine such inhibition can be overcome by adding pentothenate indicate that appropriate modifications of the medium can greatly reduce the opportunity for population changes.

Ultimate Goal

The bacteriologists concluded that the "ultimate goal for the isolation of *Brucella* from the bloodstream should be a method permitting direct cultivation onto solid media." They warned that alanine production is greatly enhanced in liquid media in the presence of immune serum, and that under such conditions population changes can occur rapidly which might cause erroneous identification of the type present *in vivo*.

Search Goes on for Agent Of Nonspecific Urethritis

Nonspecific urethritis and prostatitis could not be related causally to any particular microbial agent, concluded Capt. Bernard M. Wagner, MC, Capt. William H. Morse, MC, and Col. Dwight M. Kuhns, MC, members of the laboratory service and urology section, Walter Reed Army Medical Center, Washington, D. C.

Seeking to define an etiologic agent, to determine the role of pleuropneumonia-like organisms (PPLO), and to find the most satisfactory treatment method, the Army researchers studied nonspecific urethritis and prostatitis in 84 young males with a history of sexual exposure preceding the onset of acute conditions.

Increase in Korea

Nonspecific urethritis and prostatitis were observed in the last war but have increased since the Korean action, especially among servicemen

overseas, they reported. Although it was once thought that nonspecific urethritis resulted from inadequately treated gonorrhea, the Walter Reed studies indicated that only 32.1 percent of the patients had a gonorrhea history. Fifty-eight percent had received antimicrobial agents for acute urethritis—gonorrheal or nonspecific.

"By far, urethritis was the outstanding clinical picture," they reported. "However, 11 percent of the cases had signs and symptoms of a primary nonspecific prostatitis. In 29 percent, urethritis and prostatitis were present in equally severe form."

The study confirmed previous findings, they announced. "We were unable to demonstrate an agent or agents which could be considered as etiologic in the light of present knowledge. While human strains of PPLO may be found in an unpredictable number of cases, they cannot be implicated as causal agents at this time."

Terramycin Effective

They continued: "The almost constant parallel isolation of staphylococci with PPLO in our study and others raises the question as to whether the PPLO might not be L variants of the staphylococci." But the criteria for PPLO identification needs further investigation, they said.

No relationship was apparent between the type of organisms isolated and the ultimate effect of therapy, Capt. Wagner and his colleagues reported. Terramycin induced the most striking changes by effecting clinical response early and more completely than aureomycin plus a sharp and statistically significant reduction in the total relapses, they said. The simultaneous development of resistance to terramycin when organisms were resistant to aureomycin has been demonstrated, but it is not true that clinical failure with one means failure with the other, they said. The efficacy of terramycin observed in nonspecific urethritis suggests that the drug acts on susceptible agents relatively

resistant to aureomycin, but the exact mechanism of its action must remain speculative at this time, the researchers concluded.

Histoplasmosis Antigens Reported Isolated

The isolation of an antigen that apparently is more specific for histoplasmosis than the long-used histoplasmin which reacts with other mycotic infections was reported in a preliminary study by Charlotte C. Campbell, B.S., mycologist of the Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D.C.

This antigen, Miss Campbell said, is produced in abundance by the mycelial phase of *Histoplasma capsulatum* and reacts only with serums from histoplasma infections, but it does not detect very early complement-fixing antibody.

Another antigen isolated in the same study, is produced in greater quantity by the yeast phase of the organism and detects antibody in serums from very early cases of mild histoplasmosis. However, this antigen also reacts with serums from early cases of other mild mycotic infections.

Miss Campbell emphasized the importance of using the yeast phase antigen to detect primary histoplasmosis and use of the mycelial phase antigen to follow the serologic course of more severe cases of the disease.

Neutral Red Reaction Proves Valuable

A study of 168 freshly isolated acid-fast strains culturally consistent with *Mycobacterium tuberculosis* suggests that the neutral red test measures the virulence of mycobacteria as satisfactorily as the conventional inoculation of experimental laboratory animals.

The tests were evaluated by Maj. Warren C. Morse, MSC, Martha C.

Duill, and Lt. Irving Oltzky, MSC, in the bacteriology department of the Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D. C., and in the Second Army Area Medical Laboratory, Ft. George G. Meade, Md.

Timesaver—Reduces Hazard

They found that the use of the neutral red reaction effects an appreciable saving of time in the laboratory diagnosis of tuberculosis, taking 2 hours as compared to the 3 to 6 weeks required for animal virulence studies. Furthermore, they found that the use of the neutral red reaction reduces the health hazard to laboratory personnel working with infected animals maintained for pathogenicity studies.

Index of Sterility Proves Reliable

Use of a heat-resistant, spore-forming organism as an indicator of the sterility of laboratory instruments—similar to the process canners use on experimental packs—was recommended by Harriette D. Vera, Ph.D., research bacteriologist of the Baltimore Biological Laboratory.

Dr. Vera suggested that a few units contaminated with an organism like *Clostridium sporogenes* and included with the other units to be sterilized would be a reliable index of sterility. "It is possible to test large numbers of units of unknown contamination and obtain no evidence of failure," she said.

Experiment Results

The results of a sterilization experiment on 75 test tubes of unknown contamination and 25 tubes deliberately contaminated with *C. sporogenes* were given as an example. The tubes, dried, stoppered, evacuated, and given a heat application of about 800° F. briefly at the base, were tested about 2 months after preparation.

No organisms were found on the 75 test tubes of unknown contamination. But *C. sporogenes* was recovered from 19 of the 25 contaminated tubes—proof that the sterilization was not sufficiently effective. None of the 75 tubes had been contaminated by chance by a resistant organism—but they might have been.

"If the contaminated control tubes had not been included in the test, the heating procedure would have seemed satisfactory, and the results would have given a false sense of security," stated Dr. Vera, pointing out that a process that kills *C. sporogenes* will assuredly kill the more common contaminants such as cocci or coliform organisms.

Isolation of *C. sporogenes* from rolls of dental cotton after they had been autoclaved at 121° C. for 15 to 30 minutes led to a series of tests and the use of the organism in the Baltimore laboratory as an indicator of sterilization efficiency. The cotton was being investigated for use as air filters on the needles of bleeding units.

Efficiency Indicator

A *Bacillus* could also be used as an indicator, Dr. Vera said. But a 5-day culture of *C. sporogenes* in dextrose-free thioglycollate broth ordinarily shows heavy spore production and is convenient for use in contaminating control units, she re-

ported. It can be washed through the lumen of hypodermic needles and tubing, and can be applied to cotton, glassware, and other articles. Contaminated units are preferably prepared weeks or months in advance, dried, stored, and used as needed.

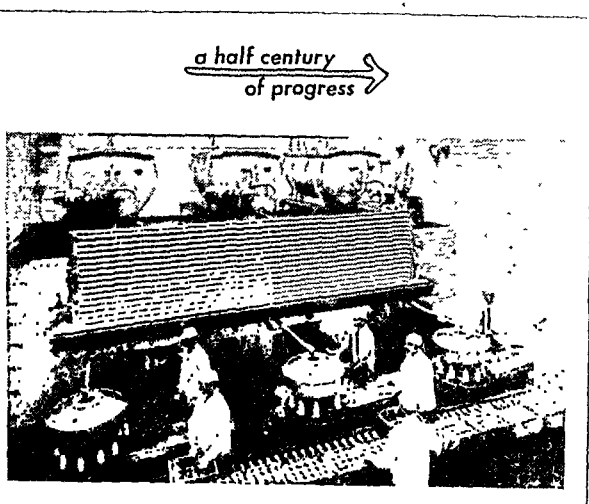
Reports on Antigen Tests For Brucella Infection

Work on the laboratory confirmation of *Brucella* infection was reported by Nell Hirschberg, Ph.D., of the North Carolina State Laboratory of Hygiene, and Mary E. Yarbrough, Ph.D., of Meredith College at Raleigh.

Results of tests using dilute phenol extracted antigens of *Brucella*, adsorbed onto collodion and onto sheep erythrocytes, were described in detail. Time and temperature at which adsorption of the antigen takes place, are important factors in the results obtained, they said.

Long extraction and simple concentration by evaporation have not increased the reactivity after adsorption onto collodion. Both procedures result in extracts unsuitable for use with sheep cells, they commented. All antigens prepared by dilute phenol extraction show a very low carbohydrate content by the anthrone reaction.

milk pasteurization



The Tuberculosis Control Problem And Modern Therapy

The newer methods of treating tuberculosis, such as chemotherapy, excisional surgery, and vaccination, were viewed with tempered optimism at the special session on tuberculosis control. The results so far are promising, the conferees were told, but as yet there is neither a widely specific cure nor effective immunization. Tuberculosis, they were reminded, is by no means a disappearing disease.

Careful Evaluation Urged For Therapy Programs

The current world-wide drop in tuberculosis mortality is a phenomenon that is gratifying but not wholly explained, Esmond R. Long, M.D., director of medical research for the National Tuberculosis Association, and director of the Henry Phipps Institute, University of Pennsylvania, stated. Dr. Long believes the decrease in tuberculosis mortality rates should supply leads for extensive social and medical research.

Optimism of experts toward chemotherapy of tuberculosis, he declared, is justified by the enthusiastic and massive accumulation of data, but he urged further unbiased assessment of the results of different methods of administration of the drugs.

Other developments in tuberculosis treatment and control cited by Dr. Long were: (1) chest surgery to remove small infected segments of the lung; (2) advancement of methods to limit sources of contagion; (3) continuous and repeated chest surveys with X-ray; and (4) expanding BCG programs, particularly the

investigations relating to the methods of administration of this vaccine.

Interest in analytical evaluations of the BCG vaccination programs, which are being conducted by the Tuberculosis Research Office of the World Health Organization, was expressed by the speaker. Also he hoped that WHO will investigate the results of oral administration of BCG as practiced in Latin America.

Surgery and New Drugs Helping More Patients

Newer methods of therapy offer assurance of recovery and freedom from relapse to an increasing proportion of tuberculosis patients, Harold L. Israel, M.D., M.P.H., of the Graduate School of Medicine, University of Pennsylvania, stated. The last half dozen years have brought new advances in chemotherapy and excisional surgery, he continued, although prolonged bed rest is still necessary in treating tuberculosis.

"The objective of treatment is no longer merely to abolish symptoms or to render the patient noninfectious; the present aim is to excise, whenever possible, residual lesions that may be responsible for relapse," Dr. Israel said.

Chemotherapy is effective, "in small measure or great," in almost every case of tuberculosis, he stated. It often results in healing of minimal or moderately advanced tuberculosis and, in advanced cases, makes surgery possible.

Surgical Risk Small

In excisional surgery, Dr. Israel said, the surgical risk is "reasonably small." He added that, in the fu-

ture, surgery may be advised for small tuberculous infiltrations "as promptly as it is now advised for tumors." Surgery should be followed by a 6-month period of bed rest and chemotherapy to insure healing of the smaller residuals, he pointed out, urging that large scale, carefully controlled studies be made to determine the importance of bed rest, "the most costly and onerous factor in present day treatment."

Discharges against advice and case mortality rates have declined markedly in the last 15 years, the physician reported, largely because of the greater receptivity of patients to the newer methods of treatment.

The present aim is to go beyond inactivity of the disease as a criteria to eradication of any residuals large enough to cause relapse, Dr. Israel stated. If this is to be accomplished no immediate saving in time or money can be expected, he continued, but both will be well spent if observation confirms the growing belief that most tuberculous patients can be cured, rather than patched up.

Ohio County Coordinates Tuberculosis Control

Administration of tuberculosis control organizations in many metropolitan areas lags behind therapeutic advances, and, unfortunately, legislative attempts to cope with the problem have not always considered the epidemiology of the disease, reported Joseph B. Stocklen, M.D., Cuyahoga County, Ohio, tuberculosis controller; Dean Halliday, executive secretary of the Anti-Tuberculosis League of Cleveland and Cuyahoga County; and Harold J. Knapp, M.D., Cleveland's commissioner of health.

The three officials cited Ohio's situation as typical. Although control is a health department responsibility, the county government is obligated to finance hospitalization and the health department finances case finding and follow-up, making standardization of control impossible except by cooperative agreement.

Control coordination has been achieved in Cuyahoga County, Ohio, by naming the medical superintendent of the county tuberculosis hospital to the position of deputy health commissioner in each of the six health departments of the county, thus giving the health units continued control responsibility for case finding, hospitalization, and follow-up.

A Community Function

The superintendent directs control activities from a centrally located clinic in Cleveland rather than from the hospital. "We believe this is important," Dr. Stocklen and his colleagues stated, "since the personnel of the tuberculosis hospital, which often is isolated geographically, tend to develop an insular attitude," and, they added, control of tuberculosis is a community function, operating inefficiently if overemphasis is placed on any one phase of control. Tuberculosis clinics in the county are staffed by part- and full-time physicians who have had extensive experience in tuberculosis hospitals.

The Anti-Tuberculosis League leads in education program and has supported the official control program whenever needed, stimulating the development of the county-wide program which culminated in the creation of the position of county tuberculosis controller in 1943. It is believed that this interlocking program with official agencies is unique among large city voluntary tuberculosis agencies in the country, the three leaders remarked.

Chest X-ray surveys in the county have been continuous since 1943, and the percentage of tuberculosis cases found among persons X-rayed has decreased from 1.5 to .6 in 1949. From the 579 deaths and approximately 1,500 new cases reported in 1940, and 262 deaths and 2,165 new cases in 1951, it is obvious, they said, "that we grossly underestimated the number of cases of unknown tuberculosis existing in the general population in 1940." Many cases either

were not known or not reported, Dr. Stocklen and his associates pointed out.

Through the years, the many tuberculosis patients needing hospital care locally has been a serious obstacle in achieving adequate control, they continued. A new addition to the county tuberculosis hospital has added 260 beds to the 850 existing high standard beds, but with the current waiting list at 258, "the staffing of these beds now appears to be a problem of the greatest magnitude," they asserted.

New Emergency Treatment

They mentioned an emergency measure adopted in 1947 when patients with active tuberculosis were admitted to the hospital for 3 days during which pneumoperitoneum was instituted and in many cases phrenic nerve interruption employed. Patients then received pneumoperitoneum on an ambulatory basis, and now streptomycin and para-aminosalicylic acid are used with excellent results, they reported.

Follow-up of 14,000 cases on the registers is a problem for the nursing divisions. Cases include all degrees of activity. Dr. Stocklen and his associates said that they are "attempting to decide whether we should follow cases of minimal, inactive tuberculosis. There is no question but that a small number of

these cases do relapse. Whether the number is large enough to justify following them remains to be answered."

Tuberculosis Problem Remains Active

"Tuberculosis is by no means a disappearing disease in this country, whether mortality or morbidity is the measure," said Robert J. Anderson, M.D., chief, Division of Chronic Disease and Tuberculosis, Public Health Service.

According to the latest estimates of the National Tuberculosis Association and the Public Health Service, there are now 1,200,000 persons in this country with tuberculosis. A half million cases are known to health departments, and 250,000 of these are active cases. In addition, there are 700,000 unknown cases, of which 150,000 are believed to be active, he reported.

Pressing Shortages

Shortage of tuberculosis facilities and manpower, and problems of budget and staff are as pressing as any in public health, Dr. Anderson said. In connection with the Hill-Burton Hospital Construction Program, it has been estimated that the Nation needs at least 50,000 new tuberculo-

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services**

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sis beds. Others maintain that the ratio should be 1 bed per 1,000 population. Despite the need, only 2,000 new beds were added under the Hill-Burton program last year, he stated.

Last year too, approximately 2,700 tuberculosis beds went unused because of a nurse shortage. The shortage of physicians is equally pressing. We must turn to or develop other personnel, if we are unable to expand the output of our physicians and nurse training sources, said Dr. Anderson. Trained aides may substitute for professional nurses, but there is no substitute for a well-trained chest physician, he said.

Dr. Anderson stressed the importance of continuing to stimulate interest in tuberculosis on the part of younger medical men and of training more physicians in tuberculosis control. In one Federal Security Agency region, not a single State now has a State controller, although only a few years ago every State in that region had a full-time tuberculosis control officer.

Dr. Anderson warned against the relaxation of effort during recent years in case-finding activities. Two million less X-rays were taken last year than the year before. At the rate of one previously unknown active case per 1,000 people X-rayed, 2,000 contagious cases were not found. Thus, he said, the tuberculosis search must be intensified in population groups from which the disease is most difficult to dislodge—as among the Indians, who have a tuberculosis death rate 5 times as high as the population at large; among mental hospital patients whose death rate is 18 times higher; and among the Negro group in which tuberculosis is responsible for every fifteenth death.

Hospitalization and treatment must be complete, which means that the final stage of rehabilitation must not be overlooked, he summed up. The variation in range of rehabilitation services offered to patients is wide, he said. Rehabilitation is more a matter of philosophy of the

sanatorium staff than an additional, expensive service, he said.

Vaccination with BCG may offer some protection to persons who are exposed to tuberculosis, but "thus far we possess neither a widely specific cure nor effective immunization," concluded Dr. Anderson. "We do know, however, the methods that in the past have brought us partial success," he said, "and so we know full well what we must continue to do in the years to come."

The Older Are Hit Harder By Pulmonary Tuberculosis

Could the exposure of fewer children to tuberculosis infection account for the phenomenal decline in infectious cases among children under 10, asked Arthur B. Robins, M.D., Dr.P.H., director, bureau of tuberculosis, New York City Health Department, in his discussion of the age relationship of tuberculosis cases.

Dr. Robins noted a significant trend in tuberculosis epidemiology between 1932 and 1950: The proportion of new pulmonary tuberculosis cases occurring in persons over 45 had doubled; more than 65 percent of New York City residents who died from the disease were over 45; men accounted for 85 percent of the deaths; mortality from all forms of tuberculosis in children under 10 reached an all-time low.

The general decrease in infection, evidenced in fewer communicable cases, their more effective isolation, and the increased resistance of exposed individuals resulting from improved living standards, was undoubtedly a major factor in the decline of infectious cases among children, Dr. Robins said.

Children Under 10

To test the hypothesis that fewer children under 10 were exposed to tuberculosis, a study with far-reaching implications was undertaken in New York City households of male

index cases. A sample of 778 cases was selected at random from a total of 3,467 men over 25 with pulmonary tuberculosis reported for the first time in 1950. Both sample and total were divided into broad age groups: those 25 to 45, and those over 45. The data were analyzed by age and race distributions; by distribution of index cases and associates according to stage of disease; by relationship of associates to index cases; by distribution of index cases and associates according to household size; and by age distribution of household associates according to sex but exclusive of marital partners. Dr. Robins discussed the findings:

Pulmonary tuberculosis in older men is more advanced at the time of discovery—56 percent of males over 45, compared with 40 percent of men 25 to 45, had far advanced disease at time of the report. The percentages were almost reversed for minimal and moderately advanced stages of tuberculosis.

Diagnoses of Tuberculosis Are Major Concern

The dependability of bacteriological diagnoses of tuberculosis is a major concern of every laboratory director, Mildred B. Jefferies, M.S., chief bacteriologist, and Albert V. Hardy, M.D., director, bureau of laboratories of the Florida State Board of Health, stated.

Specimens for evaluation may deteriorate significantly during distribution, they said. Variations in findings when widely experienced bacteriologists examine the same specimen for tuberculosis is admitted. Controls may be used in checking techniques, as in staining, but not in measuring the sensitivity of the tests, they said.

Discussing their experience with 71,852 specimens examined by cultures and smear methods over 4 years, they concluded that more effective laboratory procedures were becoming evident.

Government, Industry, Labor In Industrial Hygiene

Government, industry, and labor all have responsibilities in developing sound programs of industrial hygiene, according to the papers presented to the industrial hygiene section of APHA. A representative of an official industrial hygiene agency outlined what he believes is government's function and indicated what is expected from industry and labor. Representatives of labor and industry named the services they need from the official agencies. They agreed that a high degree of agreement and cooperation among the three is essential.

Government's Function Is Study and Development

Government's primary function in the field of industrial hygiene is research and development, with direct services being provided by State agencies only when industry cannot assume the responsibility, maintained Henry N. Doyle, chief of the State aid branch, Division of Occupational Health, Public Health Service.

Outlining government's activities in meeting its responsibility "to show the way," he noted that the Public Health Service's Division of Occupational Health carries out a broad program, ranging from studies of health hazards resulting from occupational exposures to various toxic materials to projects affecting the entire well-being of the worker. It conducts field investigations and demonstrations; makes laboratory tests and studies; gives technical and administrative aid to the State and local agencies; provides infor-

mational services; and maintains cooperative relationships with other agencies and activities concerned with occupational health.

State and local industrial hygiene agencies, which are found in 43 States, 2 Territories, and 9 cities and counties, serve industry and labor and demonstrate techniques to help them solve their own health problems. Only in a few instances, he pointed out, do these units have law enforcement powers; generally, they have found educational methods to be much more effective.

Cooperation Expected

"From labor we expect a better understanding of the aims of occupational health," he said. "We expect labor to realize that industrial hygiene is preventive medicine and not a medical care program. . . . We seek labor's cooperation in carrying out occupational health studies. . . . We expect labor to be a part of the community, to demand minimum community health services where they do not exist."

He specified also that the union health and safety committees are of

invaluable assistance in solving industrial health problems and suggested that unions make better use of their opportunities for health education.

Mr. Doyle urged that management cooperate in industry-wide studies, receive the scientific reports made by the official agencies with open minds, and develop their own occupational health programs as rapidly as possible.

Above all, he said, both management and labor should bring industrial health problems to the attention of the local occupational health unit.

Commenting on accomplishments and current trends in the field, Mr. Doyle said: "Today, the average industrial plant is a safer place, accident-wise, than is the nonindustrial environment. The classical occupational diseases are no longer the 'black plague' of industry. We have seen industrial medicine progress from strictly an industrial trauma service to a real industrial health department."

He pointed out, however, that despite this progress, "only 10 to 15 percent of the working population have any occupational health facilities at their place of employment," a situation which he attributed to the remissness of industry and labor generally in accepting the responsibility for providing industrial hy-

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industrial
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giene services themselves, and to the lack of adequate funds and staff to enable the government agencies to even begin to do the job.

Better Public Agencies Desired by Industry

Competent, unbiased public industrial hygiene agencies sincerely trying to help industry provide better conditions for its workers will receive industry's admiration and support, Louis E. Newman, manager of the health and safety services department, General Electric Company, New York City, declared.

In stating the need for public agencies of industrial hygiene, Mr. Newman said that management is often unaware of job environments that adversely affect the health, productivity, or morale of its workers. He named as examples of mass occurrence of occupational diseases the cases of radium poisoning in the watch industry during World War I, beryllium poisoning in the fluorescent lamp industry following World War II, and silicosis in the mining and foundry industries.

Public industrial hygiene agencies can also serve as arbitrators through unbiased fact-finding and advice when management and employees differ about a hazard, he said.

Advice and Counsel

Industry, Mr. Newman said, needs advice and counsel from a competent public hygiene staff, but responsibility for correcting hazards rests with the operating management.

He stressed the need for recommendations that are sensible, practical, and economical. Industry must make a profit to survive and unnecessarily expensive control measures may work a hardship on a business.

Other important service characteristics listed for public agencies were dispatch and brevity in giving reports, agreement on uniform standards, accurate evaluation of the

problem, use of language that is understandable to the layman and is persuasive, and allaying of needless fears among employees during an investigation.

The minimum unit set-up should have proper balance in the fields of medicine, engineering, and chemistry, he said. Later, other more specialized fields, such as health-physics, biostatistics, and nutrition, can be added.

To get needed jobs done and to prevent omission of large areas, Mr. Newman suggested that the areas of Federal and State responsibility be clearly defined.

Study, Revision of Laws Suggested by Labor

Study and revision of present statutes so as to provide a clearly defined and complete industrial health service without overlapping of Federal, State, and local jurisdictions was urged by A. J. Hayes, president of the International Association of Machinists.

He reported that a paper is now being prepared by the Public Health Service listing various elements of an occupational health program. This, Mr. Hayes continued, should be of substantial assistance not only to legislators, but to management and labor alike.

Man-days lost because of illness are 35 times as many as lost from strikes and 10 times as many as from industrial accidents, he said, and this is not only unprofitable, but inhumane. "We cannot be complacent about ill health," he asserted.

A National Problem

The problems of industrial health can be dealt with more constructively if they are recognized as part of the national health picture, Mr. Hayes stated. The worker's health cannot be separated from a larger consideration of the health of those around him—his wife and children, his neighbors, the community, and

the Nation. A recent study by the Division of Occupational Health of the Public Health Service showed the number of absences due to nonoccupational illness or injury to be 116.8 per 1,000 for men and 256.4 for women, he reported.

Health is not only an individual but a national concern, the speaker emphasized; health is part of the national defense. Increased production will be the Nation's salvation; productivity lost because of sickness is a serious threat to America's defense and security, he maintained.

Inadequacy or lack of appropriations for health agencies, overlapping of jurisdictions, the shortage of medical personnel and facilities, and the cost of medical care and of health insurance all contribute to the "appalling" total—4,569,000 in February 1949—of persons who are absent from work on an average weekday because of illness or a disabling condition, Mr. Hayes said, and also help to explain why many industrial plants have not installed medical units.

In closing, the speaker agreed that the responsibility for overcoming these problems is not the sole responsibility of official health agencies, but belongs to every segment of society; that to accomplish the goal of better health services, industry must give full support and encouragement to every Federal and State agency which is promoting better health.

Connecticut Coordinates Worker Health Services

An occupational health program is concerned with all factors which influence the health of industrial workers, declared Stanley H. Osborn, M.D., and J. Howard Johnston, M.D., in their report on the program of the Connecticut State Department of Health. Dr. Osborn is commissioner of health and Dr. Johnston is director of the department's bureau of industrial hygiene.

In 1928, they stated, the bureau of industrial hygiene was established in the State health department to centralize industrial health work. This bureau is concerned directly with improving the environmental conditions in industry and with assisting in establishing well-organized industrial medical services. It also serves, they explained, as a coordinating unit through which services provided by other units of the State health department may be brought to the industrial worker.

Emphasizing that the bureau's staff of physicians, nurses, chemists, and engineers work as a team, Drs. Osborn and Johnston named the primary functions of each: Physicians appraise the worker's health in terms of exposure to toxic substances and to abnormal working conditions, interpret medically the interrelation of the industrial and nonindustrial environments upon the worker's health, and help industry in establishing nonoccupational health services; chemists study and analyze the environment of the worker to determine the nature and concentration of toxic atmospheric contaminants; engineers study methods of controlling these contaminants; and nurses contribute to the discovery of occupational hazards through their contact with in-plant nursing services.

Studies of Hazards

Investigations of occupational hazards mentioned in the report included determination of atmospheric concentrations of such materials as lead dust, chlorinated hydrocarbons, and toluol and the effect of exposure to the materials. In all studies of this type, Drs. Osborn and Johnston said, efforts are made to correlate results obtained from examination of body fluids with symptoms found among exposed workers. They noted also that the hazard involved in the use of recently developed insecticides, such as parathion, is being studied by the same methods.

Problems of radiation exposure, resulting from the new industrial

uses of radioisotopes, X-rays, and natural radioactive materials, are receiving increased attention, they pointed out, as are the effects of noise and heat in industry.

The bureau's services are available at all times upon request from labor or management, medical director or plant nurse. In addition, they said, routine industrial hygiene surveys are conducted periodically, the interval between surveys depending upon the hazards associated with the manufacturing processes. New plants or changes in techniques and processes of old plants receive immediate investigation.

The bureau's value can be measured by the frequent calls for its services and the almost universal cooperation which it receives from industry and labor, Drs. Osborn and Johnston maintained.

Rusk Committee Studies Health Requirements

The reluctance of industry to employ more women, older workers, and the handicapped and the widespread lack of in-plant health services are two major barriers to the complete utilization of the Nation's manpower, asserted Seward E. Miller, M.D., chief of the Public Health Service's Division of Occupational

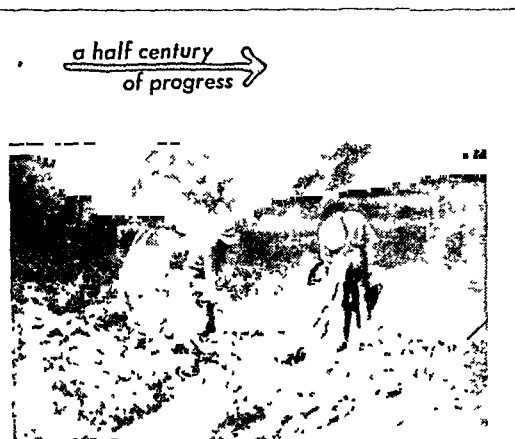
Health. These barriers are based principally on prejudiced and erroneous impressions, he said, and an educational program to dispel them has been inaugurated by the Health Resources Advisory (Rusk) Committee of the Office of Defense Mobilization.

One pamphlet prepared by the committee, entitled "The Worker and His Health," affirms that sickness absenteeism in industry, causing a loss each year of 400 to 500 million man-days, can be reduced by one-third to one-half with the establishment of in-plant health services, Dr. Miller reported. Three other pamphlets urge the utilization of women, older workers, and the handicapped in industry by showing that job performance records for these groups compare favorably with those of other workers. Dr. Miller emphasized that proper placement of these persons, considering all factors of special health problems, physical ability, and performance capability, enables them to perform many jobs successfully.

In-Plant Health Services

The committee has given considerable attention to methods of extending in-plant health service, particularly among smaller industries, Dr. Miller noted. Following a meeting with prominent leaders in the field of industrial medicine from universities, private industry, and vol-

control
of
malaria



untary and official organizations, which reaffirmed the committee's convictions that a great need exists for comprehensive in-plant health services, the committee designated a task force to investigate methods by which Government contractors could be induced to furnish at least minimal protective health services. Its efforts resulted in revisions to the Safety and Health Standards set up by the Department of Labor for the guidance of Government contractors. Standards dealing with

occupational health requirements were entirely rewritten under three headings: medical services, environmental conditions and personal services, and special sanitation services.

Other Activities

Since its establishment in August 1950, other accomplishments of the committee have been the creation of the Interagency Health Resources Council to coordinate the activities of medical-health agencies; the establishment of a single national

blood program coordinating the efforts of the Red Cross, the Armed Forces, and the Federal Civil Defense Administration; a study of civil defense health problems; and a review of military health personnel needs, resulting, to date, in estimated savings to the Armed Forces of 40 to 50 million dollars and the conservation of the services of 3,000 physicians for the civilian public. "All these activities," Dr. Miller stated, "either directly or indirectly, affect the industrial hygienist."

Methods of Administration In Medical Care Plans

Administrative methods designed to improve the quality of medical care were described in papers presented to the medical care section. These methods included: provision of medical care inside as well as outside the hospital, embracing both specialist and rehabilitation services; control of prescribing practices and of payments made to physicians under fee-for-service plans; and competent supervision of health insurance plans.

Regional Organizations Improve Health Services

Regional organization to improve health services for residents in the area of influence of medical teaching centers has been stimulated by the need for coordinating diverse health services and resources. This was one of the major points in a progress report on a survey of regional plans now being made by Leonard S. Rosenfeld, M.D., and Ruth Wadman, A.B., of the Division of Public

Health Methods, Public Health Service, and Nathan Kramer, A.B., Subcommittee on Medical Care, Committee on Administrative Practice, APHA.

Such regional organizations are designed to improve the quality and increase the availability and efficiency of all medical and related services within a community.

Their tentative findings are based on a survey of five such programs (those of the University of Colorado, Emory University, Medical College of Virginia, University of Buffalo, and the University of Kansas), and on a review of the published material on five plans still to be visited (Bingham Associates, Rochester Regional Hospital Council, New York University, University of Michigan, and Tulane University).

All plans, except Bingham Associates, which began in 1931, were launched in the 3- or 4-year period immediately following World War II, according to Dr. Rosenfeld and his co-workers. In eight plans the medical school has primary administrative responsibility.

In the other two, medical schools participate but the administrative responsibility is carried by another agency. Bingham Associates is a

philanthropic agency governed by a board of trustees; the Rochester program is governed by a board of directors composed of hospital and public representatives.

Community Services

The various services include graduate and postgraduate medical education and regular visits by consultants to hospitals, they continued. Several programs include educational and advisory services for hospital administrators and ancillary personnel.

Two of the plans have developed services for individual patients in addition to clinical consultation given as part of medical education.

Auxiliary services represent regional pooling of responsibilities ordinarily carried on by hospitals individually, such as central purchasing, blood bank, accounting and record systems, ambulance services, surveys and studies, Dr. Rosenfeld said.

All plans are designed to serve the practicing physician in the area. Some approach the physician directly, others through the hospital staff, some through both. In three plans all physicians in the areas are eligible to participate; in seven, hospital affiliation is a factor.

Financial Support

During their initial periods of operation, nine plans received support from philanthropic agencies. Tu-

lane received support from the Public Health Service. Buffalo and Kansas are also receiving support from their State governments. In all cases local financial support has been limited. The plans are now requesting financial participation by affiliated hospitals, voluntary agencies, and physicians. In Rochester, Blue Cross is contributing. From information accumulated thus far, it appears that the costs of maintaining regional services are relatively small when compared with the total costs of medical and hospital care in an area.

There is need for continuing experimentation, observation and evaluation, the investigators concluded. Because of differences in area, population distribution and density, in health needs and resources, in local traditions and attitudes, no single pattern of regional organization is suitable to all parts of the country, they said.

12 Years of Experience Modify Prepay Concepts

In discussing the early experience of the Associated Medical Services of Ontario, a Canadian prepayment medical care program, J. A. Hannah, M.D., its managing director, said that the years from 1937 to 1949 represented an organization period "during which many of our idealistic concepts were severely modified through experience."

"We believe attempts to provide such a service on a wholesale basis with insufficient experience has been, and will continue to be, the cause of failures and dissatisfaction on the part of both the public and the profession," he stressed, in reviewing experience of the plan approved by the Ontario Medical Association.

Accordingly, the Associated Medical Services was organized and maintained as a research project. Dr. Hannah's discussion was confined to a brief interpretation of special cost studies and to a statement

of the program's income and expenditures for the 12-year period.

Dr. Hannah reported that cost data are accumulated on a "number of months service rendered" basis for each year, which, he said, eliminates the making of adjustments for additions and subtractions from month to month.

Early Surplus Unlikely

He warned that in starting any medical prepayment plan, "too great optimism over a favorable surplus during the first 2-3 years is unwarranted," adding, "on the basis of our experience, we are beginning to feel that we may expect a crisis approximately every 5 years."

Dr. Hannah did not list the extent of medical coverage, but he remarked that in 1937 the Associated Medical Services was enthusiastic about "complete medical service," a concept which later was modified to check any trend toward insolvency. The first basic lesson learned, Dr. Hannah said, was that whenever the fund's solvency was threatened, services should be reduced but subscription rates should not be increased. Increasing rates retains subscribers who intend to make excessive use of their privileges but eliminates those who have not needed the service, he explained.

The Associated Medical Services withdrew well-baby visits and special nursing care, at an early stage,

because they were uncontrollable under a prepayment plan and strained harmonious professional relationships. Also, he added, it is not possible to retain solvency on a fee-for-service basis if home and office calls are included. The cost of administration is equal to or greater than the cost of actual service, it was discovered, and by paying a physician directly, patients get the same services at less cost. It was advisable to pay the larger bills which threatened family solvency, he said.

Obstetrical Load Heavy

According to Dr. Hannah, the plan paid out more than twice its expected share of obstetrical services because it appealed to subscribers in the child-bearing period. He mentioned an A. M. S. plan in preparation which will enable budgeting against cost of childbirth and prevent unfair use of the service at the expense of other subscribers.

Dr. Hannah considered coverage for people in later life well within the application of the insurance principle provided they have subscribed for "some considerable time prior to attaining that age."

One benefit from careful scrutiny of cost data was the observed increase in average costs. Dr. Hannah said these figures indicate the cost for each and every month's

appraisal of health services

REPORT OF THE COMMITTEE
OF SPECIAL HEALTH DEPARTMENT
PRACTICES

MUNICIPAL
HEALTH DEPARTMENT PRACTICES
FOR THE YEAR 1933

The Public Health Service's
GUIDE TO THE HEALTH DEPARTMENT

a half century
of progress →

service available, whether or not the subscriber sees his physician or enters a hospital. For example, among outstanding cost rises: X-rays doubled, rising from 5 cents in 1941 to 10 cents in 1949; anesthesia rose from 4 cents per month's service rendered in 1940 to 7 cents in 1949 and then increased more sharply; consultations stayed at 3 cents per month's service until the end of 1943, rising to 8 cents in 1947, and dropping to 7 cents in 1949.

Doctors, Miners Write "Finest Chapter"

The arduous, costly task of restoring men who have suffered crushed limbs and backs in the coal mines is "one of the finest chapters in the history of medicine," said Warren F. Draper, M.D., executive medical officer of the United Mine Workers of America Welfare and Retirement Fund in Washington, D. C.

In describing the UMWA medical care program, in operation 32½ months as of July 1, 1952, he stated that thousands of crippled miners have been restored to usefulness and reemployment, and that physicians in their devoted and selfless treatment of these men are bringing new knowledge of inestimable value to medical science.

UMWA Hospital Projects

The UMWA fund has been responsible for creating a memorial hospital association in Kentucky, Virginia, and West Virginia to construct, equip, and operate new hospitals in mining areas desperately needing hospital and medical care, Dr. Draper said. These three non-profit associations, organized under respective State laws, have built new hospitals to care for fund beneficiaries at Harlan, Pikeville, Hazard, Middlesboro, Whitesburg, and Wheelwright in Kentucky; at Wise in Virginia; and at Beckley, Logan, and Williamson in West Virginia.

Money for the memorial projects is provided by the UMWA Welfare and Retirement Fund through loans. The hospitals are open to members of the communities to the extent that their facilities are not needed by fund beneficiaries.

The fund neither owns nor operates hospitals but uses existing facilities according to convenience of location and willingness and ability to provide satisfactory service on an acceptable cost basis, Dr. Draper pointed out. Some 2,100 hospitals have cared for UMWA patients. Some 8,000 physicians have received payment for services. Of the combined cost of hospital and physician services, about two-thirds was for hospitals, and one-third for physicians.

Cost of Medical Care

"Completed data on hospital and medical costs in a program the size of our own should be of extraordinary value in charting the course of the future," he said in explanation of not publicizing itemized expenditures until costs have been stabilized to afford a reasonable basis for comparison with other plans.

Approximately 1½ million miners and their family dependents are potential beneficiaries of the program. The UMWA executive medical officer said that during the year ending June 30, 1952, 2,154,822 days of hospital and medical care were provided to 215,372 beneficiaries at a cost of \$49,996,517.88. Three percent of the expenditures for all medical care benefits represented the cost of administration of the medical and hospital service, including 10 area offices which cover the coal mining regions.

Services Provided

Services included in the program are: hospital care for such time as necessary, medical care in the hospitals, specialists' services outside the hospital as necessary, and rehabilitation services under the management of physicians at special centers.

Also included are drugs administered to hospital in-patients; certain expensive drugs requiring long, continuing use outside the hospital; physical examinations in connection with applications for prescribed cash benefits; and home and office care for severely handicapped patients following discharge from special rehabilitation centers.

The program does not include: dentistry, tonsil and adenoid removal, long-term treatment for mental illness, services for which the employer or some other party is legally responsible such as medical service in compensation cases, and available services which the patient may be entitled to receive from a Government agency, such as treatment for tuberculosis or mental disease in a State or county hospital, or from a private organization in the instance of tuberculosis, infantile paralysis, or cancer.

Baltimore City Reviews Prescription Practices

Increased prescribing of official drugs instead of proprietary preparations may be one way to lower the cost of public medical care programs, according to the findings from a study of prescribing practices in the Baltimore City medical care program.

The study was made and reported by Frank F. Furstenberg, M.D., director of the medical care clinic, Sinai Hospital, Baltimore, Md., Harry Goldberg, chief pharmacist at the hospital, Matthew Taback, M.A., director of the bureau of biostatistics, Baltimore City Health Department, and J. Wilfrid Davis, M.D., director of the medical care section of the department.

Drug Costs

Examination of 1,034 prescriptions, a 1-percent random sample of those written under the program between July 1950 and July 1951, revealed that over 55 percent were for proprietary drugs, the investiga-

tors stated. They estimated that an average of \$16.32 per 100 proprietary prescriptions could have been saved if official preparations having identical chemical, physical, and therapeutic properties had been used instead, representing a 6-percent reduction in drug costs for that year.

From the beginning of the Baltimore City program, drug costs have constituted a significant portion of the total budget, amounting to 30 percent during the study year, Dr. Furstenberg and his associates explained. Since the program specifies few prescribing restrictions, examination of the drug problem was considered necessary for proper administration.

Quality of Service

The study also provided data which, they said, permits certain inferences concerning the quality of medical care being provided. Among these data were the following:

Thirty-seven percent of the prescriptions were for "therapeutically nonacceptable" preparations, using as the criterion of acceptability the inclusion of the preparations in the United States Pharmacopeia, the National Formulary, or the American Medical Association's New and Nonofficial Remedies.

Forty-four percent of the prescriptions from private practice were for nonacceptable preparations, but only slightly more than 16 percent of those written in the hospital were so classified.

Refills

Fourteen of the prescriptions provided therapy for nearly a year; 31 percent of the prescriptions for sedatives, other than phenobarbital, allowed two or more refills.

Predominant types of prescriptions were for cardiac, respiratory, and gastrointestinal preparations, the preparations being classified according to probable physiological action. Analgesics ranked fourth and sedatives fifth.

Over 50 percent of the prescriptions for insulin and allergy preparations were written in the hospital medical care clinics or out-patient departments, whereas tonic and placebo prescribing was rare in these places.

Limitations Recommended

Dr. Furstenberg and his colleagues recommended, in view of these findings, that consideration be given to limiting the duration of therapy allowed on a single prescription and the number of refills allowed. Unlimited prescribing may be an important factor both in high drug costs and in questionable medical practices, they indicated.

They suggested that prescribing practices might be improved by including, in a public medical care program, education in prescription writing for the participating physicians. The use of a formulary, they said, would effect immediate economies.

Statistical Procedure Charts Fee Pattern

The administrative control of payments made to physicians on a fee-for-service basis can be accomplished by use of statistical methods, Charles

A. Metzner, Ph.D., research associate, S. J. Axelrod, M.D., associate professor, and J. H. Sloss, M.A., research assistant, all of the bureau of public health economics, University of Michigan School of Public Health, Ann Arbor, found in a study of a comprehensive prepayment plan.

Payment Methods

Expansion of medical care insurance plans will likely be based on services embodying the fee-for-service method of payment, and the problem of control of payments to physicians is increasing in importance, the Michigan investigators stated. Financial stability of any medical care program demands that receipts exceed the expenditures, they said, and in a fee-for-service plan, unlike the automatically controlled capitation and salaried systems, no inherent limit is set on the physician's income.

Analysis of available data showed abuse of services by subscribers to be minor, whether measured in terms of excessive demands for service, "shopping around" for physicians, unreasonable requests for medical care outside regular hours, or overutilization of services. The investigators therefore concentrated their study on the control of abuse by physicians in "rendering fees." Heretofore, no objective method of

federal grants-in-aid for public health services

a half century
of progress →

- 1918 Chamberlain-Kahn Act
- 1921 Sheppard-Towner Act
- 1935 Social Security Act
Titles V and VI
- 1938 Venereal Disease Control Act
- 1944 Grants for tuberculosis control
- 1946 National Mental Health Act
Hospital Survey and Construction Act
- 1947 Grants for cancer control
- 1948 National Heart Act
Water Pollution Control Act

Financial grants-in-aid from Federal to State and thence to local governments—plus loan of personnel and technical assistance—proved a significant catalyst in the growth of services and facilities for the safeguarding and promoting of the public's health.

ing the first year of the plan was designed to reimburse hospitals according to their ability to provide a complete service and also to stimulate improvement in equipment and personnel, they said. Under this system some hospitals were making substantial profits, a few were breaking even, but many were incurring deficits.

When it became evident that there is no close relationship between the quality of service and the cost of providing it, this system was superseded by per diem payments based on estimated costs, the officials reported.

Under this system the in-patient hospital revenues fluctuated almost directly with seasonal variations in occupancy, thus creating some difficulty in financing fixed expenses during low occupancy periods, the officials stated. They also pointed out that some hospitals found inclusive per diem rates an incentive to overcrowd, because a drop in occupancy meant a corresponding decrease in revenue.

Plan Sound and Workable

Both the hospitals and plan officials are pleased with the present method, they state, terming it "a sound, workable, equitable method of remuneration of hospitals for coverage under a comprehensive hospital insurance program."

The Saskatchewan Hospital Service Plan, administered by the provincial Department of Public Health in consultation with representatives of the hospitals, makes essential hospital care available on a free choice basis. It covers about 94 percent of the population in the province, or about 780,000 persons. The program is financed through obligatory personal premiums, except for the indigent, and through supplementary provincial taxation. The benefits include minimal or public ward accommodation and virtually the entire range of available in-patient service.

Scientific, Group, and Community Approaches to Obesity

The problems relating to obesity, benefits to be secured through weight reduction by overweight individuals, and various approaches to weight control were considered in a panel discussion before the food and nutrition section. Five of the papers presented are summarized here. Another paper dealing with the approach to weight control was read to a combined session of the food and nutrition and health officers section.

Louisville's Experience Points Up Obstacles

The many followers of reducing fads and the increase in sales of over-the-counter obesity drugs and dietetic foods reveal an ignorance of the obesity problem as well as general interest in its control.

This observation was made in reporting the weight control project sponsored in 1951 by the Louisville, Ky., Nutrition Committee. Four of its members who presented the committee's findings are: John S. Llewellyn, M.D., Louisville Heart Association; Emily Bennett, B.S., executive director, Central Dairy Council; Mary M. Hurley, M.P.H., health educator, Louisville and Jefferson County Board of Health; and Mildred Neff, M.A., director, division of nutrition, Kentucky State Health Department. They reported:

The instructors of the committee's weight control classes and education program were faculty members of the University of Louisville School of Medicine, teachers and community professional workers in economics, nutrition, health and physical education, and directors of insurance companies.

A physician explained the undesirable effects of rapid weight loss, use of unapproved drugs, and the fads sometimes offered in the daily papers. Lectures were held on topics including reasons for overweight, diet, the advantages and disadvantages of exercise, and the fallacy of exercise as a substitute for decreased caloric intake, and the rewards for normal weight.

Results of Program

Encouraging was the average weight loss per person of those who attended classes during the first 3 weeks. Seventy-seven (96.2 percent) lost weight in significant amounts, two maintained initial weight, and one gained weight. For this group the weight loss ranged between $\frac{1}{2}$ and $12\frac{1}{4}$ pounds for an average of 5 pounds per person during the first 3 weeks of the classes.

At the end of 26 weeks, 19 of the original class were present. Of these, 79 percent had lost weight, 3 persons had gained, and 1 showed no change.

Attendance records were discouraging, however, in spite of excellent publicity through all media of information. This indicates inertia inherently present in the public for community service. More interest probably could be obtained by appealing to the obese person individually than collectively.

Less than 1 percent of the total attendance of the classes were men. It seems advisable to offer sex-segregated classes so that men will participate. Overweight is less harmful to women than to men so far as longevity is concerned, but women are more inclined to correct overweight than men.

Great interest was shown in the graphic displays prepared by the insurance companies which statistically depicted analyses of obesity.

The obese person must be properly motivated to reduce, the committee members emphasized. In future programs therefore, the psychotherapeutic approach is to be incorporated as an integral part of the classes in hope that results will be better.

Obesity Is a Factor In Arteriosclerosis

Deaths from arteriosclerosis occur earlier in the overweight than in the nonobese population. This one fact about arteriosclerosis stands out with clarity, Norman Jolliffe, M.D., director of the bureau of nutrition, New York City Department of Health, stated.

The only advice that can now be offered with confidence on prevention of arteriosclerosis and related diseases is "never become overweight, and if overweight, reduce and stay reduced," Dr. Jolliffe said. By this means alone, he believes Americans could increase normal life expectancy by 1, 2, or perhaps even 4 years.

Dr. Jolliffe termed arteriosclerosis and the degenerative diseases as the health problem to be reckoned with in this day of an older population. When 90 percent of the people will live to and beyond the age of 45 and the life expectancy is 67.6.

People are eating as much now as they did in 1900, he said. The daily calorie consumption per person is still 3,100. As an older, less hard-working population, they should be eating less—2,870 calories per day. The need for calories decreases about 7.5 percent for each 10 years after age 25, and with easier transportation and labor-saving devices, less energy is being expended, he explained.

It has been estimated that 25 to 30 percent of the population is over the desirable weight, Dr. Jolliffe said.

Basic Principles For Reducing

He outlined three basic principles that must be applied if America's

number one health problem, obesity, is to be solved:

First, obesity is invariably caused by a greater intake of calories in food than expenditure of calories as energy. This statement leaves no "out" for the overeater who sees himself as an exception to the rule.

Second, loss of excess fat is directly proportionate to the calorie deficit, which can be obtained either by increasing the calorie expenditure or by decreasing the calorie intake. To lose 2 pounds the obese person must eat 1,000 calories less a day for a week. The equivalent in calorie expenditure, or exercise, would be 5 extra hours of walking.

Third, the reducing diet should form the basis of dietary reeducation so that proper eating habits will continue after the desired loss of weight. Skipping meals or following trick or rigid diets the person does not really understand does not establish good dietary habits. People should learn food values and how to count calories.

Five Research Methods Determine Obesity

In a discussion on criteria of overweight, John H. Browne, M.D., of the New York State Department of Health's bureau of nutrition, described five research methods of determining obesity.

With anthropometric instruments, take precise measurements of the body between designated bony landmarks and determine circumference and diameter of the trunk and extremities.

X-ray the leg or other parts of the body, cut the film along the lines of shadow of bone, muscle, and subcutaneous tissue, and skin, and weigh the pieces of film; or measure the area of the various shadows.

Determine the creatinine coefficient (said to be uncertain method).

Estimate total body fat from body water.

Determine the specific gravity of the body by weighing in air and under water; the percentage of fat can then be found by referring to tables developed by Rathbun and Pace.

Practical Methods

In everyday practice, however, simply looking at the patient is usually sufficient to determine overweight, Dr. Browne stated. The scientific techniques described are expected to add to our knowledge of precise determination of overweight and to aid in studying groups of people with regard to caloric nutritional status.

In total weight measurement, the amount of muscle and bone must be considered because of variation among individuals, Dr. Browne pointed out. By the scales, a professional football player may seem to be 30 pounds overweight, whereas a muscularly underdeveloped individual may be within the average for his height and still have an excess of fat, he explained.

Reduction in Weight May Lengthen Life

Although weight reduction is not a panacea for all of the difficulties of the overweight person, it can bring him substantial physical, psychological, social, and economic benefits, make him look and feel better, and probably lengthen his life, commented Louis I. Dublin, Ph.D., second vice president and statistician, Metropolitan Life Insurance Co.

Nevertheless, there is a "surprising dearth of information on the benefits of reducing" due to difficulty in assembling the facts and the needed long-term follow-up, he stated.

A study of 25,000 men and 25,000 women who, because of obesity, were charged an extra premium by his company revealed nothing start-

ingly new, he said. Mortality was 50 percent higher among the obese than among "standard insurance risks." However, in a special study of those among the overweight who had reduced, the death rate was found to be one-third lower for women and one-fifth lower for men than the rate for the overweight group, he reported.

Diseases Among the Obese

Diseases of the cardiovascular-renal system, diabetes, and disorders of the liver and biliary tract cause excess mortality in the obese, Dr. Dublin stated. Various studies have also shown that gallstones, gout, vascular complications, hypertension, asthma, and bronchitis have a higher incidence among the overweight, he noted. The stillbirth rate among obese women is nearly double the rate among women of normal weight.

Dr. Dublin observed that overweight may seriously handicap individuals, regardless of age or sex, in their personal lives, in employment, and in social relations. A fat child ridiculed by other children is likely to seek satisfaction in sedentary recreation and in eating.

Weight Control Groups Studied by Conference

The group approach gives promise of achieving a program of weight control, but it is not the answer to all of the problems.

This was the conclusion reached by participants in a Conference on the Group Approach to Weight Control held in Washington in June 1952 as reported by Malcolm J. Ford, M.D. Dr. Ford is chief of the program development branch, Division of Chronic Disease and Tuberculosis of the Public Health Service.

The purpose of the conference, as stated by Dr. Ford, was to bring together people with experience in the

group approach to weight control and to find out the opinions they hold in common as well as the points of difference.

The conference thought that weight control groups should be: homogenous in terms of age, background, and degree of overweight of participants; heterogenous in terms of personality; small in size (10 or 12 ideal); screened to eliminate those not likely to benefit from the experience and those with severe psychological problems; assembled in short sessions not too frequently held (1 hour once a week, tapering off to once a month); supervised by medical personnel, but leader need not have any particular type of professional training.

Some believed that group members should weigh in at each session. Others felt that this was unimportant or even detrimental. Some thought that proper nutritional information alone was all that people needed; others stressed the psychological aspect of weight reduction.

Factors Leading to Obesity

Although not the primary subject of the conference, the factors that lead to obesity were discussed. The discussants agreed:

Some people have special difficulty in hewing to a dietary line, such as those with certain ethnic or cultural food patterns.

People with little money tend to buy the cheaper carbohydrates.

Mothers after delivery fail to lose excess weight gained during pregnancy.

Emotional problems alone may be responsible for overeating.

The conference, Dr. Ford said, recommended that other controlled studies be carried on to investigate the effectiveness of the group approach as compared to the individual approach to weight control. First results from experimentation with the method were inconclusive but interesting. Before the method is advocated unreservedly, more scientific observations are needed to clear up unanswered questions.

Community Can Attack Problem of Obesity

Obesity, a threat to health and life expectancy, is an important public health problem which the community can attack, suggested W. P. Shepard, M.D., third vice president of the Metropolitan Life Insurance Co., San Francisco.

Overweight afflicts approximately 15 million people in the United States, making them especially susceptible to heart disease, kidney disease, apoplexy, diabetes, and other degenerative diseases, he said, adding that people become interested in weight control as they become aware of the health hazard of overweight. The individual's responsibility for control of his own weight must be developed by a continuing health education program.

Leadership for the community weight control program can be assumed by the major local health agency, health council, or officials, Dr. Shepard pointed out. Professional people, aware of the importance of correct weight, are valuable collaborators, he said. In addition those already interested in "reducing," can be utilized in program planning.

Arouse Public Interest

Communities will differ in resources, leadership, and interested groups, said Dr. Shepard. To arouse public interest and to stimulate individual responsibility, agencies participating in the weight control program should include: health departments, heart associations, hospitals, schools, clubs, church groups, civic organizations, and professional societies of physicians, nurses, and home economists. Sponsored programs can be public panel discussions, club meetings, movies on health subjects, symposiums and institutes for organization members, group therapy, home visits by professional health workers, and pamphlets, posters, and exhibits widely distributed and regularly issued.

Cooperative Group Action by Parents of the Handicapped

How parents can help their handicapped children, what can be done to prevent other and unborn children from being handicapped, the various difficulties faced by the parents themselves—these and similar problems were discussed before diverse sections of the conference.

Group counseling was the keynote. It was felt that the more information received by the parents, the more counseling provided for understanding their own and their children's problems, the better equipped they would be to promote a happier and more constructive life for all concerned.

Group Discussion Enhances Child Health Interviews

To the traditional individual interview procedure of the child health conference has been added the group discussion method, reported Samuel M. Wishik, M.D., M.P.H., professor of maternal and child health, University of Pittsburgh Graduate School of Public Health. He told a joint session with the Conference for Health Council Work about administrative experimentation in 1950-51 with the new technique at the Lillian Wald Child Health Station, one of the 80 stations operated by the New York City Health Department.

Dr. Wishik believes that the individual approach and the group approach can be satisfactorily combined. "It is conceivable," he said, "that the group method might economize in use of professional staff time. If certain common questions

can be answered for groups of mothers effectively, it might not be necessary to go over the same material separately with each mother. Furthermore, if certain common problems are put across with mothers in general, it may make it possible for the professional staff to devote its time in the individual interviews to other phases of parent counseling."

Dr. Wishik admitted that in its early stages group discussion is an additional task for the professional staff, requiring more rather than less time.

He remarked that the group method of idea exchange should aid in effective counseling because mothers "support and bolster" each other in the group and are more receptive to changes in child-training when they receive "ideas from their peers rather than from a professional group." Mothers, he said, are more strengthened by group discussions with other mothers in changing their practices and in substantiating some of their convictions about existing practices.

Professional Attitudes

The group technique may develop a change in staff attitudes and methods if the staff member can acquire from group discussion the habit of "listening more and of getting a more accurate impression and more intimate feeling of the experiences and points of view as well as problems of the mothers," he commented. Dr. Wishik hoped that such an attitude would carry over into the individual interview relationships between the physician or nurse and the mothers. He indicated a possible application of the group method to the private office practice of pediatricians.

These factors were selected by Dr. Wishik for successful free group discussion:

1. Skill of the discussion leader and nature of the participation of the physician and nurse.
2. Smooth functioning of gathering of mothers: avoidance of undue waiting time and noninterruption of discussion by outside factors.
3. Appropriateness of the topics to the interest of the mothers.
4. Size of the group.
5. Personality of the participating mothers.

New York Experience

At Lillian Wald, he said, 25 minutes were set aside on Thursday mornings at 10 o'clock for 12-15 mothers to meet in a large room separate from the waiting room and the children's play area. The time chosen permitted parents to have their individual interviews in the preceding hour. Seats were arranged in an informal circle. While no children were included, they had free access to their mothers from the play area where they were kept under supervision.

Parents with similar backgrounds and common problems and unhampered by language difficulties were grouped in conference periods on separate Thursdays according to the age of their youngest child. A spread in the children's ages within each span was considered desirable so that the mother who had already met a situation, such as introducing the first solid foods, could relate her experiences.

Sample topics for mothers with children from 10 to 12 months included: thumb sucking, colds, going to sleep, fear of strangers, clinging to parents, shoes, walking, weaning, bowel training, and feeding. Similarly appropriate topics were chosen for the other age spans: birth to 6 weeks, 7 weeks to 3 months, 4 to 6 months, and 7 to 9 months.

When the regular station physician and nurse participate in discussions, they can interject helpful questions, Dr. Wishik commented.

"Physicians and nurses repeatedly evidenced surprise that mothers raised questions which they had not asked in individual conferences," he noted. "When the doctor recommends something different from what was taught several years ago, a mother can ask the reason for the change in recommendation," giving him an opportunity to interpret the reasons for changes in teaching.

Parents Attend Classes On Care of Premature

Although the "premature program" is still new, it has been extremely valuable in helping parents to give better care to premature babies, Gellestrina DiMaggio, M.N., and Marguerite B. Gelinis, B.S., M.S.S.W., told the maternal and child health, public education, and public health nursing sections of the American Public Health Association and the Conference for Health Council Work.

Miss DiMaggio is administrative supervisor of children's service, Grace-New Haven Community Hospital, and clinical instructor in the Yale School of Nursing; Mrs. Gelinis is a pediatric social worker at the Grace-New Haven Community Hospital.

The key part of the program, they said, is the monthly group meetings held at the hospital, when parents, grandparents, or others assisting in the care of the baby are encouraged to ask questions and to discuss their problems.

The meetings are informal, they continued. The children's ward resident presides and a nurse and social worker help in the discussion. The nurse tells about the nursing care of the baby in the premature nursery, answers questions about his care after he is discharged, and encourages the parents to come in at any time to care for and get acquainted with their baby. The speaker stressed the importance of the visiting nurse in giving the

mother a sense of security in bridging the gap between hospital and home.

Parents' Queries Answered

The social worker described her functions, among which is the encouraging of parents to bring before the group questions they have asked her. These most often concern the reason the baby was premature, what can be expected in his growth and development, the danger of overprotection, preparation of other children at home for the advent of the baby, effect of the parents' feelings upon their care of the baby, insecurity in caring for a small infant, and fear that he may be fragile or that they may expect too much of him.

Parents feel that they have adjusted to their baby more easily as a result of these group discussions, they said, and the staff has learned a great deal, including the fact that more than a simple explanation about prematurity is needed by parents, and that the parents work more effectively with the hospital after attending meetings.

Mentally Retarded Aided By Group Methods

When one New Jersey mother advertised a few years ago that she had a mentally retarded child and asked other mothers to phone her about discussing their common problem, she sparked a remarkable group method, E. Louise H. Porter, Ph.D., registrar at the Southbury Training School, Southbury, Conn., told the joint session with the Conference for Health Council Work.

The New Jersey parents met, sought professional advice, and set off a chain of national, State, and local organizations to help overcome parental and social misunderstanding of mentally defective children, Dr. Porter noted.

"I doubt if a better group method exists," she said. "It is dynamic

because it derives from the long-suppressed feelings of parents who always believed, though silently and alone, that something should be done. To be sure, a few parents never had the belief, and some parents had lost it when they were convinced that their child should be institutionalized and forgotten. These organizations of parents have given their members faith in themselves and their children . . . This wholesome attitude engenders an improvement in the attitude of others."

The Children Improve

Effects of the new parental attitude on the children themselves are far-reaching, she continued. "Some children are enjoying the company of others of their own mental level for the first time in their lives. Others are going out into the world from which they were previously separated by shame. Still others are attending classes though they had formerly been excluded from school as noneducable. A few others are obtaining jobs because intolerance of slowness has given way in a few places. This is only the beginning."

The group method has spread to institutions too. "Previously parents traveled from many geographic areas to visit their children and returned quickly to their separate homes," Dr. Porter added. "Now they not only visit their children but remain to meet with other parents for group discussions."

Dr. Porter commented that through appreciation of an institution's problems parents have provided "the administration with a bulwark of backing when outside influences try to alter the school's carefully developed philosophy. Parents drawn into these groups have a new purpose in life, and those whose children have been living in the institution for years wish they had been wise enough to start discussions long ago. As if to compensate for the years they lost, many of them join the community groups and help bring understanding to other parents."

Group discussion is leading to action as parents realize their power as a group. Action is what the field of mental deficiency needs to obtain funds for special classes and recreational opportunities, to convince industry that the more capable mentally deficient are good employment risks, and to stimulate the professions of medicine, psychiatry, education, psychology, and social work to train their specialists for wise guidance of the mentally retarded child and his family, Dr. Porter stressed.

Own Problems Solved By Parent Groups

Intelligent group counseling by psychologists and medical social workers with parents of cerebral palsied children helps to eliminate many of the parents' misconceptions about cerebral palsy and aids them to a fuller understanding of their part in their children's development, said Harry V. Bice, Ph.D., consulting psychologist with the Bureau of Crippled Children, New Jersey State Department of Health.

Such a group counseling program was inaugurated in New Jersey, Dr. Bice reported, because parents did not feel they received adequate information about the complex nature of cerebral palsy from the professional physicians, nurses, and therapists treating their handicapped children.

He said many parents needed release from emotional tensions, as well as pertinent information about their children. They frequently expressed resentment, complaining either that they were unjustly burdened with an afflicted child or that professional personnel were not competently treating the child. To meet this dual need throughout the State, counseling groups were organized which were small enough to enable the counselor to know each child and his particular problems and to

provide parents with an opportunity for self-expression.

Subtlety in Counseling

Nondirective group counseling was emphasized, with the counselor attempting to remain in the background while parents discussed and offered their own solutions to problems that were presented. Even when it was necessary that the counselor give technical information, he tried to draw from the parents their own points of view.

Best results were achieved, continued Dr. Bice, when fathers and mothers were not both present at the same meeting, for while a mother might speak freely of tension between herself and her husband when only other mothers were present, she was unlikely to do so if he or other men were at the meeting. Therefore, five separate meetings were conducted for each group, with a sixth and summary meeting being participated in by both groups. More women than men attended the afternoon meetings, he said, and recommended that meetings for men be held at night.

Generally, Dr. Bice concluded, the parents discussed candidly their feelings of embarrassment, frustration, and guilt toward their children and contributed greatly to each other in comparisons of disciplinary and training methods.

That "Different" Feeling Mitigated by Groups

Four advantages of informal group discussions among parents of chronically ill children were outlined by Luigi Luzzatti, M.D., at a combined session of the maternal and child health, public health nursing, and public health education sections and the Conference for Health Council Work.

Dr. Luzzatti, chief, department of medicine, Children's Hospital of East

Bay, Oakland, Calif., said that the discussions held in the metabolic clinic for parents of diabetic children have provided the parents with accurate information about the disease; have helped them overcome the feeling that they or their children are "different" or "alone"; have helped to release parental anxieties; and have provided the professional staff with information about the parents and children.

Pointing out that the care of a child with chronic disease requires more than regulation of the disease, he maintained that there are limitations as to how much can be accomplished by the one-to-one contact between physician and parent in the doctor's office or clinic. Admitting this contact is useful, he expressed the belief that group discussions can significantly supplement it.

Information and Reassurance

Participating in the group discussions described by Dr. Luzzatti were the professional personnel who see the parents and children individually in the clinic and one or both of the parents of 13 of the 20 children attending the clinic.

Discussions centered generally around assigned topics such as physiopathology of carbohydrate metabolism and diabetes, management of the diabetic child, psychological adjustment to the disease, and economic problems of care. Many of the questions raised by parents stemmed from ignorance of a particular aspect of the diseases; others from a simple need for reassurance.

In retrospect, Dr. Luzzatti said, it is believed that the discussion would have been more valuable had more stress been placed on the individual problems and less on imparting information on a planned basis. "We came to feel," he stated, "that only out of an answer to their own individual problems would parents derive the ability to accept the condition and to reassure each other."

Studies of Spread Patterns Of Infectious Hepatitis

Observations on infectious hepatitis in a Baltimore housing project suggest the use of gamma globulin to stop an outbreak. Further observations in Philadelphia confirm data indicating the fecal-oral type of spread of the agent. In National Microbiological Institute investigations, heat of 60° C. fails to sterilize plasma infected with the agent of homologous serum hepatitis.

One of these studies was presented to the epidemiology section and the other two to the joint session of that section with the laboratory section.

Radial Pattern Revealed In Hepatitis Outbreak

The nearer a person lives to a home affected by infectious hepatitis, the greater is his risk of contracting the illness.

This was the opinion expressed by Abraham Lillienfeld, M.D., Irwin Bross, Ph.D., and Philip E. Sartwell, M.D., of the departments of epidemiology and biostatistics, Johns Hopkins University School of Hygiene and Public Health.

Focus of Infection

Basing their conclusions on an intensive 2-month study of an outbreak of infectious hepatitis in a Baltimore housing project in 1951, the authors stated that the disease seemed to spread from a focus near the center of the project in a radial pattern often seen in outbreaks of poliomyelitis or measles.

The Baltimore City Hospitals, located near the project of row

houses, alerted the city health department to the outbreak in July 1951. Approximately 30 cases were reported from April through September although reporting of jaundice was not required. The study was initiated to determine the number of cases and the distribution according to various characteristics of the industrial population.

Method of Attack

Interviews with residents and their physicians established that there had been 117 mild cases of infectious hepatitis among the 3,970 residents during the year prior to the study. Eight cases without jaundice were not included in the study. The general attack rate was 2.9 percent, the highest occurring in the 5-14 age group. Females had a higher attack rate than males.

Examination of school attendance records, income status, duration of residence in the city and in the project, and the history of parenteral injections did not implicate these factors in the outbreak. In fact, newcomers to the project had a lower attack rate than others, contrary to the observations made on military populations.

During the outbreak, gamma globulin was offered to some of the persons of the affected households. The total secondary attack rate for those not receiving gamma globulin was 8.8 percent, which is considerably lower than the secondary attack rate reported in other outbreaks. The attack rate among those who received the globulin was 1.4 percent.

The expected seasonal decrease was observed in the summer months with a decided increase occurring in the early autumn. Because of the pattern of distribution, the authors determined that the disease was transmitted by the fecal-oral route.

The observed pattern might be utilized as a basis for applying gamma globulin in civilian populations to stop an outbreak, the authors suggested. "In institutional outbreaks it is feasible to administer gamma globulin to all the inmates. Although this is impossible in civilian life, it would be feasible to administer gamma globulin to members of the households which are in close proximity to an already affected one since their risk appears to be greater than average."

Hepatitis Transmission Via Fecal-Oral Route

The failure of nurses in a Chicago orphanage to properly wash their hands after each change of infant diapers was a major source of infectious hepatitis in one of the classic institutional outbreaks.

Most of the essential epidemiological points gleaned from that outbreak were discussed by Joseph Stokes, Jr., M.D., professor of pediatrics of the School of Medicine of the University of Pennsylvania. In outlining the epidemic, which pointed to the fecal-oral route of transmission, he reported the following:

Peculiarly, the disease seemed to appear only in new student nurses shortly after they began their training and did not seem to appear in the children or other adults at the institution. The knowledge of the presence of the disease there since 1942, and the fact that new interns also had begun to contract the disease, began by 1948 to deter new interns and nurses from applying for admission.

Gamma Globulin Injected

After November 7, 1948, gamma globulin was injected as a palliative and diagnostic measure into all new student nurses upon admission. Just prior to that date, 42 of 144 incoming students had developed jaundice soon after admission. In the 36 nurses who received the gamma globulin injections no jaundice de-

veloped for the succeeding 10 months. One exception was noted—a nurse who received her globulin 2 days prior to onset, a fact which confirmed the continuing endemic nature of the disease.

Skin tests for the presence of virus in the stools of certain children were conducted and evaluated. An evaluation of orphanage personnel, a tracing of possible sources, and hepatic function tests on key children and adults were made.

The liver function tests pointed to the fourth and fifth floors as the locale of the diseased children—over 80 percent of the student nurses who developed jaundice during the period from January 1, 1946, to November 7, 1949, had done so within 3 weeks of entering or of leaving the fourth and fifth floors. None of the mothers contracted the disease even though they were exposed to contact with the student nurses and ate and drank the same food and water.

The gamma globulin injections were halted on September 1, 1949, at which time 20 new nurses were admitted, 9 of whom developed hepatitis.

By use of volunteers, the presence of active cases of hepatitis A or of intestinal carriers was demonstrated by testing stool preparations from two children who had symptoms and positive liver function tests.

Hand Washing Effective

Following careful instructions on hand-washing techniques, no jaundice has occurred even in the absence of gamma globulin since December 1949 to the present time.

The outbreak supports other data indicating hepatitis A has a fecal-oral type of spread and does not appear to spread by nasopharyngeal secretions. A respiratory route of transmission would have brought the disease to at least one of the mothers in the Chicago orphanage, and the simple improvement in the cleanliness of nurses would not have stopped the disease if it had a respiratory route of spread from child to nurse.

The incubation period of epidemics of this disease is from 20 to 35 days but may be increased by attenuation of, or decrease in the number of, viral bodies in the infective material.

Immunity Attained

Individuals can be chronically active cases and carry the virus in their stools. Gamma globulin, administered at least 7 days prior to expected onset, is effective, at least as a temporary protective agent, in doses as small as .01 ml. per pound body weight. There is the suggestion that passive immunity can be changed to passive-active immunity if the individual continues at risk during waning passive immunity.

It appears best to have experience with the virus at an early age since jaundice is rare in hepatitis cases in the youngest age groups. Recently developed skin tests suggest that the hepatitis A virus, like measles or mumps viruses, may be of uniform antigenic properties which produce permanent immunity.

Virus of Serum Hepatitis Survives Heat

Plasma infected with the agent of homologous serum hepatitis retains its ability to produce jaundice even after being heated at 60° C. for 4 hours, reported five researchers in the laboratory of biologics control, National Microbiological Institute, National Institutes of Health, Public Health Service.

The study from which this conclusion was made was described by Roderick Murray, M.D., William C. L. Diefenbach, M.D., Frank Ratner, M.D., and Nicholas C. Leone, M.D. It is one of several being conducted to determine the effectiveness of existing and proposed methods of sterilizing blood and blood products.

Volunteers Inoculated

According to the investigators' statements, the study involved the

inoculation of three groups of volunteers with samples from a pool of infected plasma: one group of 10 men was inoculated with 1.0 ml. of plasma which had been heated for 2 hours; a second group of the same number, with 1.0 ml. of plasma which had been treated for 4 hours; and a third group of 5 men, with 1.0 ml. of plasma which had remained at room temperature. The heating had been accomplished by suspending 10-ml. bottles containing 7 ml. of infected material in a water bath, with each bottle completely immersed. The water was constantly agitated and the temperature maintained at about 60° C.

Dr. Murray and his associates stated that three cases of frank jaundice and one showing clinical signs and symptoms of hepatitis but with no visible jaundice occurred in the group inoculated with plasma heated for 2 hours; three cases of frank jaundice and two cases showing abnormal laboratory findings occurred in the group which had received the plasma heated for 4 hours; and one case of frank hepatitis occurred in the group which had received the control material.

Health Hazard Guarded

Subjects participating in this and other studies, Dr. Murray and his colleagues explained, are inmates of Federal penitentiaries, over 21 years of age but below middle age, who volunteer for the experiments. Each volunteer is carefully screened by a review of his past medical history, a complete physical examination, and a battery of liver function tests. After inoculation with the test material, the subjects are examined weekly. They are questioned as to their health, observed closely for possible icterus, and examined carefully for the development of signs of hepatitis. In addition, the set of liver function tests is repeated. On development of sustained symptoms or abnormalities, the subject is hospitalized for observation and treatment.

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and early disease detection and treatment. He enjoys regular working hours, liberal off-duty periods, regular vacations with pay, and at times sabbatical leave for special training. The Health Insurance Plan of Greater New York (HIP) is also considering a retirement program for all participating physicians, he reported.

Dr. Baehr continued that under HIP 30 such medical groups, comprising almost 400 family physicians and 550 specialists, now provide comprehensive medical care to 400,000 persons in New York City. Since 90 percent of the participating families have selected a permanent family physician whom they may use regularly without financial deterrents, he felt that a far more favorable opportunity exists for an intimate and continuing doctor-patient relationship than in "solo" fee-for-service practice among similar low or moderate income families.

"Perhaps the most significant experience with group practice under HIP," he concluded, "has been the growing awareness among the group directors and specialists that the family physicians are the keystone of this type of practice and that the quality of medical care which they provide determines the reputation and the growth potential of the medical group."

Baltimore Program Relies On Community Practitioner

By uncovering multiple instances of unsuspected disease and by restoring clients to the point of employability, the Baltimore City medical care program is sound public health and an economic advantage to the community, according to George W. Dana, M.D., director of the medical care clinic of The Johns Hopkins Hospital. The program, instituted in 1947, endorsed by the Baltimore City Medical Society, and financially supported by the State

legislature, provides continuous medical service to persons maintained by Baltimore's Department of Public Welfare, he said.

Dr. Dana told the joint session that the program, which is under the authority of the commissioner of health, affords the client his own participating medical practitioner, an affiliating hospital, and free drugs.

Clientele, in family units, are assigned to an affiliating hospital having its own complete medical care clinic and are given initial medical examinations, Dr. Dana stated. The clinic routinely forwards clinical reports to the client's physician and provides consultative and laboratory services at his request. Currently, the 24,500 Baltimore clients are receiving medical care service from 300 participating physicians, 59 of whom carry an assignment of 100 persons or more, he reported.

The community practitioner is the central figure in the program's concept of medical supply, Dr. Dana continued. Participation is voluntary and available to all Maryland

licensed practitioners. A physician expresses his interest to the medical care clinic directors of affiliating hospitals with which he desires association. He is paid under the capitation fee system at the rate of \$7 per client per year, providing home and office care at an average of 2.4 services per client per year.

Schools Can Educate For Useful Service

With "a broader concept of preventive medicine as to its environmental and social aspects, the medical school will more completely fulfill its function and responsibility in meeting the realities and demands of medical practice for today and tomorrow," Walter L. Bierring, M.D., commissioner of health of the Iowa State Health Department, told the joint session.

Because the practicing physician today works in his office or in the hospital more than in the home, he

Preventive medicine as practiced by the general practitioner is not limited to his office; it is found wherever he goes—in his daily practice, in his postgraduate studies, and in his civic activities through his community health council. Each decade preventive medicine occupies more of the general practitioner's time.

Without the cooperation of the general practitioners of America any preventive medical program, whether national, State, or local in character, is doomed to failure. Practicing physicians look to public health officials for leadership.

The general practitioner, however, should be led, not pushed. Continuous education is the key.

Public health is a specialty. Few general practitioners have the time or the training to do a good job in part-time public health work. Organized public health units with full-time personnel constitute the essence of good health protection.

—J. S. DeTar, M.D., Milan, Mich., speaker, House of Delegates, American Academy of General Practice; president, Michigan Health Council.

is no longer as familiar with the hereditary, family, home, personal, and economic environment of his patients as in the past and cannot judge the importance of these factors in relation to disease, Dr. Bierring said.

The result, he said, is that social workers and agencies rather than physicians are most concerned with the environmental and social implications of health. Therefore, he maintained, the general physician should be taught the importance of understanding the civic activities related to medicine, problems of school health, maternal and child health, family life, and environmental influences, not only that he may be more useful to his patients, but that he may serve his community throughout his professional life.

During the past half century great and beneficial changes have taken place in scientific investigation, medical practice, and specific curative medicine, the physician continued, and these changes have resulted in a corresponding evolution in methods of medical education.

Medical Education

Undergraduate medical education should not only lead to the best care of the sick, the prevention of disease, and the promotion of health, Dr. Bierring went on, but should also provide opportunity for developing and using knowledge of medicine as a whole through integration of basic and clinical sciences, wider application of clinico-pathological conferences, and greater emphasis on preventive medicine. Specialist training should be postponed to the graduate years.

In addition to the problems of preventive medicine, which include occupational diseases, malnutrition, maladjustment, psychoneurosis, social deficiencies, and health education, Dr. Bierring said, long-term or chronic diseases are now a large part of general practice.

"Advancing the Frontiers of Public Health"

Health officers, public health nursing, medical care, and industrial hygiene sections of the APHA joined to present a "Joseph W. Mountin Memorial Session" in

Cleveland. The texts in full are published in the January 1953 issue of the American Journal of Public Health. Excerpts from the texts follow.

Introduction

By Leonard A. Scheele, M.D.,
Surgeon General,
Public Health Service

"Six months before his death, Dr. Mountin participated in a symposium on the Arctic Health Research Center at a general staff meeting of the Public Health Service. His opening sentences may be taken as an epitome of his major contribution to public health.

"'It might seem incongruous,' he said in that deceptively hesitant manner we knew so well, 'that at the last staff meeting I appeared before you as an apologist for the aging and made a point of identifying myself with that group; now, 2 weeks later, I come again as an Arctic explorer. That incongruity is something I would like to make a point of.'

"Everyone who knew Joe Mountin would like to make a point of the amazing diversity of his interests. He might call it 'incongruity,' but the ripe fruit of his brilliant mind was this very recognition that whatever affects the health of man is the proper study and a proper field of public health action. With recognition went his complete identification with the problem. Joe Mountin had in a very real sense the curiosity and instant response that Judge Learned Hand has called 'magnificent meddling': the force that drives man onward in his quest for mastery of the world he lives in."

Local Health Department

By Hugh R. Leavell, M.D.,
D.P.H., Professor of Public
Health Practice, Harvard Uni-
versity School of Public
Health

"Joe Mountin's great contributions . . . were based on sound knowledge of health problems derived from a long and rich first-hand experience at all levels of government, and on certain personal qualities which characterized him. . . . His contributions in public health administration stemmed from a broad, dynamic, progressive concept of 'health' . . . [which] must depend on differences in time, place and problem. . . . He kept asking: How well suited is the orthodox program of health departments to the needs of the people? What role is the department willing to occupy in areas beyond its traditional interest? How well equipped are public health groups to carry such additional functions as they may be called upon to discharge?"

"The history and development of local health units was well known to him, and many years ago he stated certain principles which should govern the organization of such units. . . . The governmental health department was of paramount importance in Mountin's eyes . . . the focal point of the community's health activity. It should contain the special perspective and the wealth of competency to be able to perceive the need; and it should have the

ability and the courage to take whatever action is necessary. . . .

"He did not conceive of the health department as doing the total health job . . . [and] although the health department should definitely not engage directly in all kinds of health activities, it should find ways to participate in each type. . . .

"Mountin appreciated the importance of understanding the private practitioner's problems and finding methods of work with him. . . . With increasing extension of public health activities into the field of personal health services, particularly in chronic disease control, he realized the importance of not going too fast and of carefully working out professional relationships. . . . If health departments were to do their job properly, Mountin thought they would need to work very closely with hospitals and other agencies providing medical care. . . ."

Chronic Disease and Aging

By Vlado A. Getting, M.D.,
D.P.H., *Commissioner, Massachusetts Department of Public Health*

"It is almost impossible to review the development of any program in public health in the past score of years without finding Joe's guiding hand somewhere in its development. He brought out the need of health departments to evaluate their programs carefully, to consider the characteristics of the total population they serve, saying that health is positive and that public health responsibility must be geared to promoting ever higher standards of human efficiency and satisfaction. . . . He reminds us that there has been phenomenal progress in the development of programs for children, and he suggests that the same type of approach as was used in studying the child and his needs is now needed for the mature and older members of the community. . . .

"While Dr. Mountin stimulated not only health departments but also

voluntary agencies to assume a vital role in the development of a community program for older people, he indicated that such a program must be a community program shared by all. . . . If the health department develops an understanding of the problems of the aged and arouses community interest, he was convinced that the health department need do only a small fraction of the total program itself, and that the community as a whole will awaken to its responsibility. . . ."

Regionalization

By John B. Grant, M.D., *Associate Director, Division of Medicine and Public Health, The Rockefeller Foundation*

"Joe Mountin's chief characteristic was the embodiment in his philosophy of a comprehensive horizontal rather than a vertical specialized approach to problems of public health. And another characteristic over the years was the manner in which earlier general principles were later amplified in detailed recommendations. . . .

"Organization is the cornerstone required for the advance of any frontier of public health. . . . Mountin considered that multiplicity of agencies was the chief evil to be attacked. The summation of his thinking was that this evil required regionalization under a single administration for its removal. His guiding principle was that enunciated by the British Ministry of Reconstruction in 1919: 'The first principles of good administration require that when a special function is to be undertaken, it shall be undertaken by one governing body for the whole community needing the service, and not for different sections of the community by several governing bodies.'

"The level of health services of the nation in 1975 will be proportionate to the degree that Mountin's recommendations are implemented

for integration of all services through regionalization under a single administration."

Medical Care

By Franz Goldmann, M.D.,
Associate Professor of Medical Care, Harvard University School of Public Health

"With creative imagination and common sense he crusaded for the continued adaptation of medicine to social needs and uses, and he had the courage to state and defend unorthodox views at a time when many others were aloof, if not hostile, to any proposal implying a change from chance to choice. Knowing that truth does not necessarily conquer by itself, he was untiring in interpreting new ideas against the background of historical developments. . . .

"Mountin frequently expounded each and all of the rules of sound administrative organization [democratic, simple, and inexpensive] and used every opportunity to make them living facts in the administration of tax-supported health services. . . . Mountin did not confine his interest to technical matters and questions of methodology. He gave much thought to some of the concepts guiding contemporary health policy and, especially, the theory of separation of preventive and curative health services. . . . [and] was confident the blending of preventive and curative service could be achieved through a complete health program. . . .

"Mountin fought under the flag of faith embroidered with the words: 'Let the welfare of the people be the supreme law.' He never wavered under the fire of those drawing together around the flag of fear. By taking such a stand he acted in conformity with George Washington's maxim: 'Let us raise a standard to which the wise and honest can repair.'"

Field, Laboratory, and Legal Approaches to Treponemata

Reports of new data and new approaches to the syphilislike diseases, yaws and pinta, a review of a laboratory evaluation-guidance program, and a suggestion for reevaluation of premarital blood test laws were heard by APHA members attending the laboratory and epidemiology sections, and by the Conference of State and Provincial Public Health Laboratory Directors.

Pilot Study Should Precede Mass Treatment of Yaws

In treating yaws, a house-to-house canvass where everyone would be subjected to clinical, anamnestic, and serologic examinations would be ideal but is often impossible, impractical, or too difficult, said Charles R. Rein, M.D., associate professor of clinical dermatology and syphilology, New York University-Bellevue Medical Center, New York City.

Any treatment campaign based solely on clinical examination, he said, is limited because persons in the incubation stage of yaws are missed if no clinical manifestations are evident, and it is impossible to detect the seropositive asymptomatic latent yaws patients who ultimately may develop cutaneous relapses, thereby setting up new infectious reservoirs. Also there will be included some nontreponemal disease that will respond to penicillin therapy, thereby causing a fallacious increase in cures. Some nontreponemal conditions which do not respond to penicillin will result in a fallacious decrease in cure rates, Dr. Rein cautioned.

"The number of patients with nonvenereal conditions subject to penicillin therapy would depend on the diagnostic acumen of the clinicians," he said.

Dependence on anamnestic evidence is also fraught with difficulties, he said. "The word soon gets around among natives that they will receive some 'magic medicine' if they state that they have had yaws, and this they will gladly do with the hope that it will cure their bone pains, malaise as well as many imaginary ills."

Serologic Survey

A house-to-house serologic examination would be slow. The interval between serologic survey and institution of treatment would require several days. Some individuals requiring therapy would not be available when treatment teams revisited the houses. This type of survey, Dr. Rein emphasized, would require extensive laboratory facilities to examine the large number of blood specimens and well-trained serologists to evaluate results.

Dr. Rein quoted Dr. H. J. Magnusson as comparing the problems of combating yaws with those in shooting down attacking enemy planes: It is foolish to fill the sky with flak to shoot down one or two planes. Precision-aiming mechanisms, accurately controlled and well-manned, are needed.

It may be feasible to treat entire populations in high prevalence areas without regard to serologic examinations, Dr. Rein explained, but careful serologic examinations with tests known to have high levels of sensitivity and specificity are greatly needed in low prevalence areas. "To date, the filter paper method and the various modifications of the Chediak reaction have not been proven to be of

sufficient sensitivity and specificity as compared to the standard tube or slide tests performed on serum. While the use of capillary tubes for collection of specimens has been found satisfactory in the United States, this would not be a practical approach to the yaws problem," Dr. Rein added.

A simple, inexpensive and yet consistently effective serodiagnostic procedure is greatly needed in low prevalence and underdeveloped areas with inadequate laboratory facilities and insufficient trained technicians, he noted.

Limitations

Without an awareness of the limitations of serodiagnostic procedures in mass treatment campaigns, errors of omission and commission will arise, the syphilologist warned. These chief limitations are false negative reactions, false positive reactions, and seroresistance.

A pilot group with a well-controlled laboratory set up as soon as possible, and preferably before mass therapy is instituted, is important whether or not serodiagnostic procedures are to be employed, Dr. Rein stressed, for it is during the demonstration, survey, and training phase of the pilot program that the laboratory can supply information of value during the later expansion and consolidation of the campaign.

This information should include, he said, darkfield disappearance time following therapy to determine the immediate efficacy of the penicillin preparation to be employed, quantitative serologic tests to note the serologic trend following therapy, and differentiation between relapse and reinfection.

Would Preassess State Laws On Premarital Examination

The marked decrease in the number of syphilis cases reported in recent years, especially infectious syphilis, calls for a reevaluation of

the premarital examination laws as a case-finding and control technique, two California health officials believe.

Philip K. Condit, M.D., and A. Frank Brewer, M.D., of the division of preventive medical services, California State Department of Public Health, offered California's experience during the 12 years, 1939-51, as an indication of what the tests accomplish.

8,100 Cases Since 1939

In California, more than 2 million persons have had premarital blood tests for syphilis since 1939. The tests required by State law discovered 8,100 cases of previously unknown and untreated syphilis, 510 of them primary and secondary syphilis, and about 3,000 in need of further treatment.

Finding infectious syphilis cases and bringing them to treatment to prevent transmission from one marital partner to another to the child is the first objective of the premarital law, Dr. Condit and Dr. Brewer pointed out. Treatment of the other cases discovered fulfills another objective by preventing further progression and disability.

The case-finding returns, however, are diminishing, they found. The number of syphilis cases reported from all sources in California declined 63 percent from 1946 to 1951 for all forms, and 88 percent for primary and secondary syphilis.

Ratio of Infections

Attending the decline in syphilis prevalence is the smaller number of cases discovered by premarital tests, the doctors found. From 1949 to 1951 the ratio of infections to persons tested decreased from 1 in 437 to 1 in 553 for all forms.

The ratio for primary and secondary syphilis decreased by more than 50 percent—from 1 in 2,168 to 1 in 4,836. Thus, the unit cost per case of this type discovered more than doubled during the 3 years, they noted.

In actual numbers the score for

the 3 years stands: premarital examinations, 511,160; all syphilis cases discovered, 1,079 (primary and secondary, 162). Thus a total of the cases found by the premarital tests constituted 3.4 percent of the State total; 32,315 cases were reported from all sources in the State.

Although the 162 infectious cases found was proportionately small, the doctors called attention to the fact that an indeterminate number were prevented by the premarital tests, which served to get medical supervision and treatment for the infected individuals.

Indiana Rates Performance Of Laboratories in State

The goal of a laboratory evaluation-guidance program is to assure in the interest of public health, the best possible service to medical practitioners, Paul Fugazzotto, M.S.P.H., Ph.D., chief serologist of the bureau of laboratories, Indiana State Board of Health, told the Conference of State and Provincial Public Health Laboratory Directors.

The policy of the State health department must be one of active interest, he continued, and the participating laboratories should feel that the health department, or reference center, will guide and help whenever needed. A program that guides rather than polices, and that assists the laboratories to solve problems, is the most desirable, he felt.

Volunteer Participation

In Indiana, Dr. Fugazzotto reported, such a program has resulted in 50 laboratories participating on a volunteer basis, in addition to the 67 approved for making premarital and prenatal serologic tests for syphilis.

Technical phases of the Indiana program, he said, include checktesting of clinical specimens, distribution of control serums, study of reagents, consultation service to laboratories, including the checking of environmental temperatures at which test

reagents are stored and used, review of general techniques and equipment used, and evaluation of serologic test performance.

Deficiencies in test performance of a participating laboratory should be diplomatically but specifically called to its attention, Dr. Fugazzotto continued, with explanation of possible cause and suggestions for remedy or improvement. Technicians often feel that their test performance is not entirely satisfactory and are glad to be told why and what to do about it, he stated.

Causes of Difficulties

Only visits from a trained serologist will discover the cause of most difficulties, the speaker said. Some of these difficulties are due to environmental conditions or failure to follow test specifications, he said, but others are caused by intangible factors which are not described in the literature and "the technician needs someone to tell him where he has failed to consider such factors."

Visual Tests Adequate In Pinta Mass Survey

Pinta may be diagnosed with sufficient accuracy for mass surveys by examination of exposed surfaces of the body, reported Walter F. Edmundson, M.D., associate director, and Sidney Olansky, M.D., director of the Venereal Disease Research Laboratory, Public Health Service, Chamblee, Ga., and Arnoldo Lopez Rico, M.D., chief of the Center of Epidemiological Studies, Rural Co-operative Medical Service, Apatzingan, Michoacan, Mexico. They based their conclusion on clinico-serologic surveys conducted by the Center of Epidemiological Studies in four communities in the Tepalcatepec Basin in Mexico.

The evidence from these surveys indicates that "latent" pinta must be very uncommon, the speakers

stated. Only 4.64 percent of 194 children, 16 years of age or less, clinically diagnosed "no pinta," had either positive or doubtful serologic reactions. In three of the villages, only 2.76 percent of 145 children had reactive serologies. Special efforts were made to study children, Dr. Edmundson and his colleagues explained, in order to differentiate serologic results caused by pinta from those caused by syphilis since pinta is usually acquired in childhood and syphilis, known to be common in the area, in adolescence or later.

The "No Pinta" Group

Of 348 persons of all ages clinically diagnosed "no pinta," 14.37 percent had reactive serologies, the investigators reported. The assumption can logically be made, they maintained, that these reactions were syphilitic reactions, "biological false positives," or residual seroresistance following adequate treatment of pinta. Although the persons in three of the villages were queried as to previous treatment with penicillin or arsenicals, the reliability of their answers is questionable since many of the patients with pinta seemed to feel that an admission of previous treatment would injure their chances of additional medication.

The speakers pointed out also that it is known that lesions of pinta may occur only on unexposed surfaces of the body in about 1 percent of the cases, but they believe their occurrence is probably rarer statistically than the other causes of reactivity mentioned.

Although pinta does not generally cause disabling or killing effects, this disease deserves large-scale control efforts by the nations in which it exists, concluded Dr. Edmundson and his co-workers. The disfigurement caused by the disease interferes with personal freedom and with the development of a healthy outlook on life, they stated. Freedom of choice as to place of habitat, employment, and selection of a mate is drastically curtailed by affliction with pinta.

Professional Training for Pediatricians and Nurses

The well child conference is being used as a key element in the pediatric training of medical students at the University of Washington and in the pediatric residency at the University of Pennsylvania, it was reported to the maternal and child health, public health education, and public health nursing sections.

During a session on "professional education in public health," reports were also heard from Detroit concerning the use of monthly discussion meetings which bring together public health nurses from the health department and maternity service nurses of the hospitals.

The Philadelphia project they described included these features:

Assignment of residents in pairs to the same weekly conference throughout their 2-year training period.

Selection of cases which afforded opportunity for long-time study.

Limitation of appointments for each resident to four during a 2-hour session.

Informal discussion of the cases between the resident and supervisor at each session.

Assignment of a member of the university teaching staff to each session.

Conferences among the supervisors for discussion of the program.

Materials and Evaluation

Materials used in conducting the health conferences included, in addition to the usual medical record form, a sheet on which was noted the development of motor skills and a yearly summary of the child's progress from the first through the sixth year, and a newly designed health record booklet in which notes as to diet, vitamins, and next appointment date were made by the physician and notes of the child's progress and questions to bring up at the next conference were made by the parent.

Evaluation of the program, important to the success of any program, they said, has been obtained from both the supervisors and the pediatric residents. Typical of the supervisors' comments quoted was this one: "It is extremely valuable to have residents involved in this experience while they have access to counsel and expert advice from the staff. It creates interest in good preventive pediatric care. . . . It is a definite contrast to the classic teaching experience with specific

Child Health Program Trains Pediatricians

A public health department pediatric training program in connection with its child health program was suggested by Elizabeth Kirk Rose, M.D., and John A. Rose, M.D., as a possible solution to the problem of including experience with normal children in the pediatric residency curriculum. Dr. Elizabeth Rose is chief of the division of child hygiene, Philadelphia Department of Health, and assistant professor of pediatrics, University of Pennsylvania, and Dr. John Rose is assistant professor of psychiatry at the university.

Child health conferences, they noted, provide a group of normal children who can be seen regularly over a number of years. The organization of a training program for pediatric residents in connection with these conferences requires, however, that provision be made for adequate supervision of the residents' work.

diseases. . . . It demonstrates variability of normal growth and development." Questionnaires circulated among the residents revealed "unanimous approval of this opportunity to associate with well children," they reported.

Nurse Sessions Improve Hospital Maternal Care

Periodic discussion meetings by maternity nursing supervisors and other interested hospital and public health personnel have contributed significantly to the improvement of maternity and infant care facilities and procedures in Detroit hospitals and to a better prepared maternity personnel, reported Garner M. Byington, M.D., Dr.P.H., maternal, child and school health director of the Detroit Department of Health.

Subjects discussed at the meetings included: over-all maternal and child health programs; maternity hospital rules and regulations; venereal disease problems relating to mothers and infants; proper formula sterilization; incubators and their operation; hand-washing facilities; and general cleaning of nursery space. To promote an improved nursing service, copies of the American Academy of Pediatrics' "Standards and Recommendations for Hospital Care of Newborn Infants—Full-Term and Premature," were provided to hospitals lacking them.

Expectant Parent Classes

Since prevention of premature births and the early care of premature infants are of major importance, continued Dr. Byington, classes for expectant parents were established in several hospitals. Postpartum classes have been started also by a few nursing supervisors.

In discussions with hospital and public health personnel the availability of a city ambulance to transport premature infants to properly equipped hospitals was stressed, and approved methods of

preventing infection, correct feeding, providing heat while the baby is in the delivery room, and maintaining heat upon removal to the nursery were discussed.

Dr. Byington stressed the value of the exchange of information and views between hospital and public health personnel. By public health nurses being informed of improved hospital methods, he said, they then are able, in their home visiting, to promote the acceptance of newer techniques of perineal care and the elimination of cord dressings and umbilical bands among mothers who, having had other babies, might resist the "drastic" changes.

Complete Care Accented In Pediatric Training

A complete program of care is accented at the University of Washington's child health center where pediatric training is received by the medical students, reported Robert W. Deisher, M.D., associate professor of pediatrics and director of the center.

Teamwork features the services of a medical social worker, public health nurse, nutritionist, dental hygienist, dentist, psychologist, and psychiatrist as well as pediatrician, he asserted. Conferences with the mother and evening visits to the child's home are included for the student, who may also call on any of the staff when necessary. Also, he visits a preschool nursery. Staff conferences which are moderated by the psychiatrist are also held.

Many students think at first that a well child conference is a health department function. They spend 40 to 45 carefully allotted hours at the center and are able to see the interrelationships of some of the basic principles of pediatrics, public health, and psychiatry. They grasp the functions of each member of the staff as well as what phases other than the physical are significant in following a child's growth and development, he said.

RN-PHN Group Discussion Produces Better Service

In addition to improvement of nursing care of mothers, one real benefit from the monthly meetings of the maternity nurses of metropolitan Detroit is the better understanding and friendship developed among nurses, said Irene Nelson, R.N., director of education at the Women's Hospital in Detroit, Mich.

Encouraged to attend the group sessions are all nurses, students, and others interested in obstetrics, but regular notices are sent to nurses in charge of the obstetrical departments in metropolitan hospitals, the State hospital nursing consultant in the area, and nurses from the nursing division of the Detroit Department of Health and the Visiting Nurse Association.

"The public health nurses attending the meetings are now our friends, and we call upon them when questions or problems arise. I am sure that we had as many questions and problems in the past, but we hesitated, not knowing whom to contact in the public health agency. These meetings are held in different public health stations or centers and hospitals in the city. Tours are arranged so that nurses have a chance to see and learn about the public health facilities and various hospitals," the speaker reported.

Common Understandings

The meetings afford an opportunity to explain changes in hospital techniques, she said. Before these meetings were held, mothers were told by some that babies did not need abdominal binders, although previously they had been told by others that binders were necessary. "We can only decrease a mother's fears and anxieties and make our teaching effective when we teach the same things," she pointed out.

**Part II of This Special Section
Will Appear in Our February Issue.**

Nursing in Venereal Disease Control—A Suggested Guide

During the past few years there has been a dramatic change in the venereal disease problem in the United States. Control activities have reduced the incidence of syphilis and with newer treatment schedules, therapy can be carried out in clinics or in the offices of private physicians. However, special venereal disease centers are still needed. These changes require the application of new skills and techniques. This is particularly true of the public health nursing services which will more and more be called upon to assume responsibility for participation in venereal disease control activities.

In response to the expressed needs of health departments, this publication has been prepared as a guide in planning for nursing service in the community in relation to venereal disease. Developed by the nursing branch, with guidance from the medical staffs of the Division of Venereal Disease and the Division of Public Health Nursing, it covers the venereal disease program, public health nursing in the venereal disease program, the clinic, and an evaluation.

The section on nursing includes a discussion of the nurse's responsibilities in case finding, health education, and care of the sick; and the principles, functions, and content of the patient interview. Physical facilities, equipment, and clinic procedures are considered in the third section, as well as follow-up activities in the clinic and in the field.

Nursing in Venereal Disease Control. A suggested guide. (Public Health Service Publication No. 198) 1952. 27 pages. 15 cents.

Financial Status and Needs Of Dental Schools

Dental education, in common with all other fields of higher education, has felt the impact of accelerating scientific progress and economic change. It is confronted today with the complex problems of maintaining high standards and meeting increasing demands in the face of costs and backlogs of need for space and equipment. In recognition of these urgent problems, the Council on Dental Education of the American Dental Association asked the Public Health Service to undertake an intensive study of the financial status and needs of schools of dentistry.

This report, parts of which were summarized in the October issue of *Public Health Reports*, covers the 40 American dental schools in full operation during 1949-50. The study analyzes faculty resources, operating expenses, separately budgeted research, postgraduate instruction, sources of income, and unmet needs for staff and facilities. Information on operating expenses and income of the 18 schools of dental hygiene in operation during the same period is also included in the report.

Financial Status and Needs of Dental Schools. (Public Health Service Publication No. 200) 1952. 83 pages; tables, charts. 25 cents.

Distribution of Health Services in the Structure Of State Government

Part Two—General Services and Construction of Facilities for State Health Programs

"Distribution of Health Services in the Structure of State Government" is the subject of a decennial study made by the Public Health Service for the purpose of presenting a picture of total State organization for the provision of health services. The data for the 1950 survey are being published in four parts,

the first of which, "Administrative Provisions for State Health Services," was reviewed earlier. Parts three and four will cover personal health services and environmental health and safety services.

Part two is concerned with the organization, policies, and practices for the provision of general supportive services and construction of facilities for State health programs. The first section is a discussion of the methods by which State agencies supply general technical services which contribute to several of the specialized health programs. Because of the interrelationships among programs, these services have been treated separately, although they do not develop independently, but as parts of the specialized programs which they support.

Another State activity of importance in the total health picture is the program for expansion and improvement of hospitals and health centers. This forms the second section of the discussion, which gives the status of hospital construction programs administered by the hospital authorities of each State and Territory, the District of Columbia, Puerto Rico, and the Virgin Islands as of December 31, 1950.

Mountain, Joseph W., Flook, Evelyn, and Mullins, Rubye E.: Distribution of Health Services in the Structure of State Government 1950. Part Two, General Services and Construction of Facilities for State Health Programs. (Public Health Service Publication No. 184, Part Two) 1952. 117 pages; tables. 35 cents.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Effect of Fluoridated Public Water Supplies On Dental Caries Prevalence

By FRANCIS A. ARNOLD, JR., D.D.S., H. TRENDLEY DEAN, D.D.S.,
and JOHN W. KNUTSON, D.D.S., Dr.P.H.

SUBSEQUENT to the epidemiological and experimental findings that the use of fluoride waters reduced the prevalence of dental caries, a number of studies were undertaken to evaluate the effects of adjusting the fluoride levels of public water supplies to an optimum concentration, about 1 ppm of fluoride (F). Preliminary and annual reports from these study areas have appeared in the literature from time to time during the past 5 or 6 years (1-9). Essentially, the findings of all these studies are in accord although each has its individual characteristics from a procedural standpoint.

The present paper reports in more detail than a preliminary report (1) the methodology and results of one of these studies, namely, the Grand Rapids-Muskegon study, and includes the results obtained after 6½ years of fluoridation of the Grand Rapids water supply.

Selection of Study Area

Because much of the background data regarding the effects of fluoride waters on dental

caries was obtained in the north central part of the United States, this general area was selected for the fluoridation project. The choice was further influenced by the fact that (a) a considerable amount of data had been obtained on children who had used domestic water supplies for which Lake Michigan was the source, and (b) all evidence suggested that this general area had a high dental caries experience rate (10). Following a careful survey of a number of communities in this area, and with due consideration of the numerous details which influence a project of this sort, the city of Grand Rapids, Mich., was selected for the primary study area. The city of Muskegon, Mich., which has the same source of water and similar treatment procedures as Grand Rapids, was chosen as a control area. To establish what might be termed an "expectancy curve" for this study, a natural fluoride area, the city of Aurora, Ill., was selected. The Aurora water supply contains 1.2 ppm F and has a reliable history of constancy back to 1895 (11).

Base-Line Examinations

Dental examinations were started in Grand Rapids in September 1944. Four trained dental officers performed the examinations in selected schoolrooms, using mouth mirrors and explorers, and standard type examining lights. The examining equipment throughout the study has been a double-end SSW No. 3 explorer and standard plain mirror. The source of light has been a standard E. E. N. T. examination lamp.

Dr. Arnold is associate director in charge of research and Dr. Dean is director of the National Institute of Dental Research, National Institutes of Health, Public Health Service. Dr. Knutson is chief dental officer of the Public Health Service.

Cooperating with the Public Health Service in this study are the Michigan Department of Health and the University of Michigan.

Table 1. Distribution of continuous resident children examined in Grand Rapids and Muskegon, Mich., and in Aurora, Ill., according to age and year of examination

Age last birthday	1945 Aurora, Ill.	Basic ex- aminations 1944-45	1945	1946	1947	1948	1949	1950	1951
Grand Rapids, Mich.									
4.....	30	323	540	300	168	137	75	117	168
5.....	407	1,633	1,714	831	886	842	777	720	853
6.....	473	1,789	1,186	628	663	736	697	748	750
7.....	516	1,806	149	82	69	55	54	438	423
8.....	469	1,647	15	216	135	138	155	501	470
9.....	368	1,639		525	465	484	519	520	582
10.....	397	1,626		109	108	111	125	131	141
11.....	383	1,556		17	18	22	140	130	151
12.....	401	1,685	174	85	38	60	130	200	176
13.....	401	1,668	953	547	625	600	574	530	497
14.....	433	1,690	273	173	196	152	153	130	128
15.....	467	1,511	80	53	80	64	64	58	53
16.....	371	1,107	4	3	233	245	209	177	198
Muskegon, Mich.									
4.....		20		43	18	26	51	41	63
5.....		402		321	348	422	340	359	351
6.....		462		339	312	305	393	310	291
7.....		408		36	42	36	30	274	223
8.....		376		18	13	10	12	190	275
9.....		357		213	215	199	197	227	277
10.....		359		62	57	52	52	51	62
11.....		293		12	10	14	146	141	139
12.....		328		21	19	11	28	43	48
13.....		377		197	207	208	214	173	225
14.....		369		77	50	79	66	63	59
15.....		292		18	44	41	34	35	21
16.....		248		1	199	205	132	146	155

Bite-wing X-ray examinations were made of a representative sample of children examined by the different examiners to evaluate, in part, the "examiner error." The result of this evaluation will be the subject of another report. A complete oral examination was made and a residence history obtained, which, for the younger children, was verified by a questionnaire signed by parent or guardian. Only the principal dental findings will be considered here.

The examiner dictated his findings in code to recording scribes. The code used for recording dental conditions is similar to one described previously (12). It is designed to give a complete description of the health status of all teeth and each surface of individual teeth, both separately and collectively. A short "indoctrination" period was used to acquaint the examiners and scribes with the code and to establish consistency among examiners regarding the sub-

jective assessment features of diagnosis. Virtually all pupils of the school systems of the selected cities were examined, including nursery schools and junior college students where available.

Subsequent Annual Examinations

Following the original "prefluoridation" examinations, annual dental examinations have been made in Grand Rapids and Muskegon. These examinations are being conducted in the same manner as were the original ones. There have been changes in dental examiners with the exception of one officer who has participated in each series of examinations. Each new examiner has been calibrated against this one officer to standardize diagnostic criteria.

These annual examinations are made at the same time each year (October and November)

and are performed on selected samples of the school children. This annual study sample was selected after careful review of census data and consultation with city planning department officials. On the basis of available information, the 31 school districts of Grand Rapids were classified on a socioeconomic basis. From the 79 schools in these districts, 25 representative schools were selected, and the examiners were assigned schools on a basis of equal-sized samples of comparable population groups. In Muskegon, the annual examinations have been conducted in almost all schools, excluding only a few small schools on the periphery of the city where many students are from rural areas. The examiners work in the same schools each year. Each new examiner is assigned the schools which had previously been assigned to the examiner whom he replaced.

Selected age groups of children are examined within each of the schools. Selection is made on the basis of school grade or class, using all children present in a class or grade of a school. Choosing examinees by grade in this manner will, in some instances, not give well-distributed specific age groupings. For example, an eighth-

grade group will give a well-distributed 13-year-old age group, and will include the older 12-year-olds and younger 14-year-olds when specific age groups are based on age at last birthday. The number of grades included in the 1951 examinations give well-distributed age groupings through the 13-year-old groups.

Each child in a selected grade or class is examined regardless of his residence history. The examiner has no knowledge at the time of examination whether or not the individual examinee is a "continuous resident" of the city in which the examinations are being held.

The following table shows the grades, or selected class groups from these grades, which were included for each annual (fall) examination in Grand Rapids and Muskegon subsequent to the original or basic examinations:

Year	Grade or class
1945-----	Kindergarten, 1, 8
1946-----	Kindergarten, 1, 4, 8
1947-----	Kindergarten, 1, 4, 8, 11
1948-----	Kindergarten, 1, 4, 8, 11
1949-----	Kindergarten, 1, 4, 6, 8, 11
1950-----	Kindergarten, 1, 2, 3, 4, 6, 8, 11
1951-----	Kindergarten, 1, 2, 3, 4, 6, 8, 11

Table 2. Dental caries experience in deciduous and permanent teeth of continuous resident children of Aurora, Ill., as observed in the 1945-46 examination period

Age last birthday	Deciduous teeth		Permanent teeth				
	Number filled	Total def ¹	Decayed	Missing ²	Filled	Total DMF ³	Percent of children with DMF teeth
	Number of teeth per child						
4-----	0. 10	2. 07	0	0	0	0	-----
5-----	. 25	2. 79	. 059	0	0	. 059	2. 7
6-----	. 38	3. 36	. 263	. 002	. 015	. 280	15. 2
7-----	. 44	3. 51	. 661	. 009	. 035	. 705	33. 9
8-----	. 54	3. 60	. 917	. 014	. 111	1. 042	44. 8
9-----	. 49	2. 98	1. 185	. 063	. 274	1. 522	55. 2
10-----	. 27	2. 28	1. 426	. 089	. 505	2. 020	66. 5
11-----	. 15	1. 18	1. 755	. 227	. 688	2. 670	72. 3
12-----	. 05	. 43	1. 774	. 219	. 958	2. 951	73. 1
13-----	. 01	. 13	1. 658	. 236	1. 195	3. 089	73. 3
14-----			1. 750	. 305	1. 584	3. 639	78. 3
15-----			1. 989	. 501	2. 047	4. 537	83. 1
16-----			1. 941	. 533	2. 712	5. 186	85. 4

¹ Decayed, extraction indicated, or filled deciduous teeth.

² Includes teeth listed as "remaining roots" and teeth destroyed beyond any possible repair.

³ Decayed, missing, or filled permanent teeth. Each tooth is counted only once. A tooth which shows a filled surface is considered a filled tooth regardless of whether or not it has additional carious areas.

Table 3. Dental caries findings, deciduous teeth, in Grand Rapids and Muskegon, Mich., school children, 4-13 years of age, according to year of examination

Age last birthday	Number of def ¹ deciduous teeth per child							
	Basic ex- aminations 1944-45	1945	1946	1947	1948	1949	1950	1951
Grand Rapids, Mich.								
4	4.186	5.398	3.427	3.190	3.022	2.747	2.462	2.131
5	5.369	6.151	5.083	3.893	4.027	3.273	2.501	2.273
6	6.431	6.979	5.725	5.379	4.784	4.590	3.730	2.977
7	6.293	7.658	6.110	5.841	5.200	4.833	4.715	4.031
8	5.782	8.000	5.097	5.074	4.877	4.748	4.908	4.123
9	4.591	-----	4.446	4.110	4.428	4.410	4.229	3.856
10	2.837	-----	2.835	3.157	3.063	2.856	2.359	2.426
11	1.345	-----	2.118	2.778	1.773	1.193	1.162	1.351
12	.473	.276	.129	.105	.250	.354	.245	.295
13	.176	.130	.139	.136	.170	.103	.147	.117
Muskegon, Mich.								
4	5.050	(²)	3.442	4.667	4.385	4.412	5.317	4.460
5	6.820	-----	5.860	5.052	5.552	5.556	5.649	5.218
6	7.167	-----	6.239	6.179	6.056	5.992	6.019	5.667
7	6.663	-----	6.833	5.952	6.917	6.333	5.825	5.771
8	6.061	-----	4.833	3.846	4.800	6.083	5.063	5.320
9	4.885	-----	4.315	4.344	4.714	4.482	4.088	4.173
10	3.084	-----	3.145	3.667	2.788	2.769	3.490	2.855
11	1.328	-----	1.667	2.900	.643	1.212	1.085	1.460
12	.422	-----	.143	.368	.636	.679	.605	.312
13	.234	-----	.289	.174	.106	.112	.127	.147

¹ Decayed, extraction indicated, or filled deciduous teeth. A decayed and filled tooth is counted only as a filled tooth.

² The 1944-45 basic examinations in Muskegon were not done until late spring of 1945; therefore, no repeat examinations were made in the fall of 1945.

In addition to the routine dental examinations in these two cities, special studies, including bacteriological and chemical studies of the saliva, are being made on selected groups of children. The results of these studies will be reported at a later date.

Fluoridation

The addition of sodium fluoride (NaF) to the Grand Rapids water supply started in January 1945. Since that time, the people of this city have been ingesting a water with a fluoride content of 1 ppm F. Daily analyses show that this concentration has been maintained within a 0.2 ppm range (13). No significant mechanical difficulties of any consequence have been encountered. Also, in the course of 7 years of fluoridation, no established complaints of any

ill effects have been encountered from the numerous manufacturing and processing concerns, nor from the population involved.

The water supply at Muskegon remained unchanged until July 1951, when this city started adding fluorides to its water supply.

Results

Base-line data were obtained on the oral health status of 31,007 Grand Rapids residents aged 2-24 years, 8,304 Muskegon residents aged 4-25 years, and 8,811 Aurora, Ill., residents aged 4-20 years. The present report includes only the findings in regard to dental caries in "continuous resident" children aged 4-16 years. This selection excludes the results on children of these ages who have lived outside their respective communities for more than 3 months in

any one calendar year. Table 1 shows the number of continuous resident children of these ages examined each year and their distribution by age.

For purposes of comparison, the results of oral examinations of Aurora school children are shown in table 2. As mentioned previously, the results at Aurora represent the caries experience in children who have used water containing 1.2 ppm F throughout life. It is this same caries experience that one might expect to find in the teeth of Grand Rapids children after fluoridation has been in progress a comparable period of time in respect to the specific age group under comparison.

It should be noted that the dental examiners in this study obtained similar results to those

findings previously reported in the basic epidemiological studies for 12-14-year-old children of Aurora, Ill. (11).

The amount of dental caries experience observed at each examination in the deciduous and permanent teeth in both the study and control areas is shown in tables 3 and 4. There has been a reduction in the amount of dental caries observed in the Grand Rapids children subsequent to fluoridation of their water supply. For example, comparison of the 1951 and 1944-45 findings on permanent teeth shows this reduction to vary from 66.6 percent in the 6-year-old children to 18.1 percent in the 16-year-olds (table 4 and fig. 2). A similar comparison of results at Muskegon shows the percentage reduction to range from 1.5 percent in

Table 4. Dental caries findings, permanent teeth, in Grand Rapids and Muskegon, Mich., school children, 5-16 years of age, according to year of examination

Age last birthday	Number of DMF ¹ permanent teeth per child							
	Basic examinations 1944-45	1945	1946	1947	1948	1949	1950	1951
Grand Rapids, Mich.								
5	0.109	0.082	0.049	0.038	0.038	0.031	0.028	0.048
6	.775	.558	.234	.367	.262	.380	.261	.259
7	1.886	1.718	1.110	1.087	1.036	.759	1.034	.844
8	2.945	3.267	2.542	2.615	2.304	2.155	1.766	1.577
9	3.898	-----	2.981	3.116	2.671	2.478	2.383	2.040
10	4.921	-----	3.697	3.556	3.514	3.560	3.168	2.929
11	6.409	-----	4.235	3.556	4.318	4.686	4.362	3.669
12	8.073	9.529	7.624	7.026	8.317	7.015	7.100	5.886
13	9.734	10.759	8.920	8.469	8.338	8.111	7.206	6.600
14	10.945	11.901	9.410	9.500	9.414	8.895	8.546	8.211
15	12.482	12.675	11.264	11.938	10.609	11.797	10.121	8.906
16	13.499	13.000	9.333	12.472	13.502	11.833	11.350	11.061
Muskegon, Mich.								
5	.065	(²)	.044	.069	.062	.135	.086	.117
6	.811	-----	.481	.657	.790	.631	.748	.799
7	1.988	-----	1.331	1.048	2.194	1.433	2.011	1.879
8	2.810	-----	2.833	2.154	3.500	2.583	2.958	2.629
9	3.808	-----	3.291	3.535	3.578	3.883	3.894	3.516
10	4.906	-----	4.274	3.596	4.865	4.442	4.529	4.323
11	6.318	-----	4.250	4.700	4.714	5.932	5.667	5.338
12	8.655	-----	8.429	6.789	7.818	7.214	6.884	7.708
13	9.981	-----	9.015	9.227	10.524	9.523	9.578	9.364
14	11.995	-----	11.091	12.000	12.266	11.076	12.111	11.356
15	12.862	-----	11.167	12.886	12.659	10.324	10.943	12.381
16	14.068	-----	19.000	12.769	14.307	12.508	13.911	13.161

¹ Decayed, missing, or filled.

² The 1944-45 basic examinations were done in the fall of 1945.

A decayed and filled tooth is counted only as a filled tooth. were not done until the late spring of 1945; therefore, no repeat

6-year-olds to a high of 15.5 percent in the 11-year-olds. In Muskegon, the number of examinations was smaller, especially in the older age group. The 5-year-old group of 1951 is older by an average of 4 to 5 months than the same age group of 1944-45. Preschool children were examined in 1944-45, but in 1951 only children old enough for entrance to kindergarten were examined. It should be noted that the percentage reductions observed at Muskegon do not fit a consistent pattern as do those at Grand Rapids and may, in part, represent sampling error.

In establishing DMF rates, two portions of this rate are derived from observations based almost entirely on objective assessment, namely, the number of missing teeth and the number of filled teeth. Table 5 shows a comparison of the number of missing and filled permanent teeth

for the study and control areas. There has been a reduction in the average number of missing teeth observed in Grand Rapids children up to and including the 13-year-old age group. This situation did not prevail in Muskegon. The findings in regard to the average number of filled teeth in these two areas would not explain the reduction in missing teeth. There has been little change in the average number of filled teeth in Grand Rapids whereas in Muskegon this average shows some indication of having increased slightly in the younger age groups.

Discussion

The 1951 results in this report represent the findings of the seventh year of a study on the effect of fluoridation of public water supplies on dental caries prevalence. The results in

Table 5. Comparison of the number of filled or missing permanent teeth observed in Grand Rapids and Muskegon, Mich., children during the basic (1944-45) examination and the 1951 examination

Age last birthday	Filled permanent teeth							
	Grand Rapids, Mich.				Muskegon, Mich.			
	Number per child		Percent of total DMF		Number per child		Percent of total DMF	
	1944-45	1951	1944-45	1951	1944-45	1951	1944-45	1951
5.....	0.006	0.006	5.51	12.50	0	0.011	0	9.40
6.....	.072	.068	9.29	26.26	.063	.109	7.77	13.64
7.....	.338	.317	17.92	37.56	.312	.404	15.69	21.50
8.....	.822	.834	27.91	52.89	.719	.927	25.59	35.26
9.....	1.395	1.220	35.79	59.80	1.518	1.690	39.86	48.07
10.....	1.899	1.270	38.59	43.36	2.100	1.613	42.80	37.31
11.....	2.559	2.437	39.93	66.42	2.497	2.237	39.52	41.91
12.....	3.480	4.239	43.11	72.02	3.930	3.000	45.41	38.92
13.....	4.444	4.525	45.65	68.56	4.603	4.907	46.12	52.40
14.....	5.454	4.602	49.83	56.05	5.637	3.797	46.99	33.44
15.....	6.738	5.604	53.98	62.92	6.773	5.476	52.66	44.23
16.....	8.406	8.263	62.27	74.70	8.426	8.916	59.90	67.75
	Missing permanent teeth							
	Grand Rapids, Mich.				Muskegon, Mich.			
	Number per child		Percent of total DMF		Number per child		Percent of total DMF	
	1944-45	1951	1944-45	1951	1944-45	1951	1944-45	1951
5.....	0.001	0			0	0		
6.....	.001	0			.004	0		
7.....	.017	0			.017	.013		
8.....	.044	.013			.037	.044		
9.....	.150	.046			.160	.101		
10.....	.281	.163			.241	.339		
11.....	.478	.179			.407	.468		
12.....	.645	.460			.741	.854		
13.....	.836	.366			.937	.929		
14.....	1.045	1.195			1.149	1.085		
15.....	1.239	.849			1.240	1.857		
16.....	1.501	1.197			1.500	1.574		

Grand Rapids for 1951 represent findings after 61½ years of exposure to a fluoride water environment. The tabular data indicate a definite reduction in age specific caries rates in Grand Rapids children. As shown in figures 1 and 2 the observed caries rates for Grand Rapids have changed over the past 6 to 7 years and in the younger age groups are approaching the findings on continuous resident children of Aurora, Ill., in 1945-46.

It is of special interest to note the increment in dental caries between ages 6 and 9 years. In Grand Rapids for this age period in the basic examinations, this increment was 3.123 DMF teeth per child as compared to 1.781 DMF teeth per child in the 1951 examinations. For Muskegon children, the basic examination results indicate an incremental increase between the years of 6 to 9 of 2.997 DMF teeth as compared to 2.717 as observed in 1951. Thus, the increment of dental caries over this 3-year-age period has decreased in Grand Rapids by 1.34 DMF teeth while at Muskegon the decrease is only 0.28 DMF teeth.

Attention is called to the fact that DMF rates in this age group (6-9 years) reflect mainly the caries rates in first permanent molars. In other words, the results to date on Grand Rapids children indicate that their first permanent molar teeth are decaying at a rate which is only 57 percent of the 1944-45, or prefluoridation,

Figure 1. Comparison of dental caries experience in deciduous teeth of continuous resident school children in Grand Rapids, Mich., and Aurora, Ill.

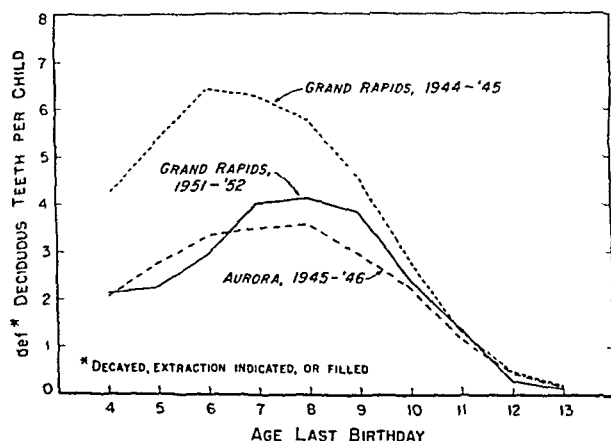
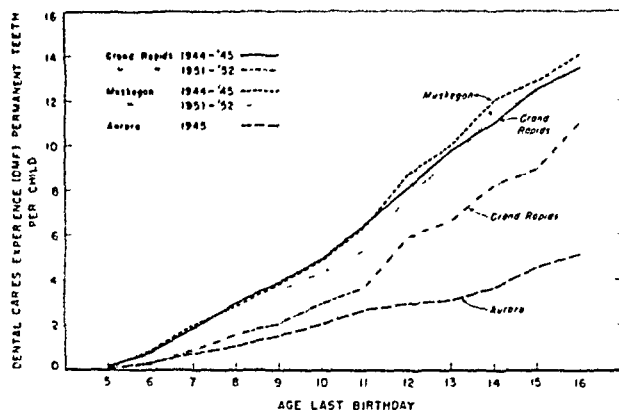


Figure 2. Comparison of dental caries experience in permanent teeth of continuous resident school children in Grand Rapids and Muskegon, Mich., and Aurora, Ill.



rate. Also, considering that only the 6-year-old and part of the 7-year-old children were born into a fluoride environment, this result is consistent with the findings for Aurora children.

It should be noted that the only known major change affecting the environment of these two groups of children over the period of study has been the fluoridation of the Grand Rapids water supply. There have been no concerted efforts to inaugurate any special caries control programs, such as topical fluoride programs, in either city since the study started. From an epidemiological standpoint the results of this study, together with those of other comparable studies, permit the conclusion that adjusting the fluoride content of public water supplies will result in a reduction of the incidence of dental caries in school children.

Summary

The methodology and results after 7 years of the Grand Rapids-Muskegon study have been described. The 1951 results on continuous resident children after 61½ years of fluoridation of the Grand Rapids water supply indicate:

1. There has been a reduction in dental caries rates in permanent teeth of Grand Rapids children ranging from 66.6 percent in 6-year-old children to 18.1 percent in the 16-year age group. Similar results have been obtained regarding the deciduous teeth.

2. Similar reductions have not been observed in Muskegon where the water supply remained

"fluoride-free" (<0.2 ppm F) until the last 3 months of this study period.

3. This change in dental caries rates at Grand Rapids was also reflected in observations based on objective assessment, that is, a reduction in the number of missing teeth.

4. A comparison of the 1951 caries rates in Grand Rapids with those of Aurora, Ill., shows that insofar as can be determined to date the use of a fluoridated water gives the same beneficial effects as does the use of a natural fluoride water of similar concentration.

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"We are in danger of building a Tower of Babel"

By VANNEVAR BUSH, D.Eng., Sc.D.

An eminent scientist speaks of overspecialization and the volume of publication . . . and proposes concrete action

EVERY SCIENTIST feels acutely today the effects of overspecialization. The volume of publication is so vast that it is impossible to keep abreast of it, even as the field of interest is narrowed. Whole new sciences and branches of engineering appear, with their specialized societies and journals. Intensely progressive gatherings of research workers develop their own jargon, unintelligible except to the initiated, heightening the barriers which separate their works from the main stream of progress.

Dr. Bush is president of the Carnegie Institution of Washington. As wartime director of the Office of Scientific Research and Development he was intimately associated with developments in nuclear fission and with the work of the Committee on Medical Research. Dr. Bush's address to the 23d annual Scientific Assembly of the Medical Society of the District of Columbia appeared in full in the January 1953 issue of the Medical Annals published by the Society. These excerpts are presented with permission of the editors and the author.

We are told that, long ago, there was a strange sort of real estate development. My memory of what I learned about it in my youth is somewhat hazy. But it seems that there was a project to construct some sort of Empire State Building, only much larger and more grandiose, reaching up toward the sky and mingling with the clouds. It was called the Tower of Babel. As the story goes, it was never completed, for the plans ended in confusion. The workmen suddenly found that each one was speaking a special language and that no man understood what the other was saying. So the minor construction went on piece by piece, but none of the pieces fitted; and the general plan of construction was completely lost. We are in danger, in science, of building a Tower of Babel.

The Complexity of Man

This is especially true in the science that deals with man. For man is complex, with a complexity far exceeding that which was assumed in the early days when the practice of medicine was a simple matter of applying empirical experience

and the science of medicine was nonexistent. As we have learned more, so have we learned that there is vastly more to learn before any comprehensive over-all understanding can emerge. A unitary organism has been found to involve the widest possible range of science, in the interconnected phenomena by which it functions to maintain existence in its environment.

Very subtle organic chemistry appears in connection with its hormonal system, its enzymes and vitamins, its antibodies, the nucleic acids of its genetic apparatus, and the metabolism of its proteins. A mysterious process by which a substance molds its surrounding medium into its own image transcends all that classic chemistry has to teach. In the chemistry of muscle, that process, unused by man in his artificial engines, whereby the energy of chemical combination is transformed directly into mechanical work without the intervention of any other forms, leads us into thermodynamic and chemical considerations beyond our present comprehension. The electrochemistry of nerve action introduces relationships far more bizarre than those simple effects which man utilizes in his batteries or his electrometallurgy.

And all this is affected, in completely ungrasped ways, by the functioning of a brain, which in its mere complexity reaches far beyond the relatively feeble electronic computing devices of which man is currently so proud, and which undoubtedly also involves phenomena the mere nature of which we cannot now specify or define, much less examine. The human system is unbelievably complex, and its examination by research calls for all the science that man has yet learned and for much which is still a closed book.

All this gives zest to our endeavor. It makes the study of man by man the most challenging problem that man can conceive. There will be many researches, many papers, many lives lived, before there can emerge that integrated, complete understanding which alone can form a sound and adequate scientific base for the profession of medicine. And in the meantime we pursue individual paths, which continually diverge, which become daily more specialized; and there is danger that the pioneers on the boundary of knowledge will completely lose touch with one another, that we shall learn

more and more about less and less, and that the grand design may be completely obscured by the inconsequential detail which we pile up before it.

I can give you no solution for the quandary in which we find ourselves. There is probably no single solution. But there are a number of things which would help.

Versatility and Understanding

For one thing, I feel that it is obvious that the present day calls for more versatility and breadth of understanding. The difficulty is to acquire these virtues without at the same time becoming superficial. I feel that in our education, not merely in the field of medicine but in all the professions, we need more emphasis on the ability to grasp, on learning to learn, with the sacrifice of a great deal of practical, detailed, factual knowledge; more dependence on ability to find and evaluate, and less on memory. For the facts presented to memory are today overwhelming in any profession, and the attempt to carry them all, even for a narrow field of practice, can lead only to mental indigestion and a stultifying of those qualities which distinguish a human brain from a book or an adding machine.

This leads to the thought that we need to give attention to the means by which our accumulated knowledge becomes stored and transmitted. The printed page, the library, the spoken word, the lecture—in the forms in which they have operated for centuries—are no longer adequate for the purpose. And we seem to be doing little to improve the means for gaining access to our accumulated knowledge, which is growing at a prodigious rate. The holdings of prominent university libraries have been doubling every 16 years for some time. The number of journals publishing results of original research runs into many thousands. The pace is now increased and especially marked in science. How many of you, for example, have time to keep up with the literature written in the various fields of medicine?

It is strange that we seem to be so baffled by this problem in these days of intense mechanization. Machinery, control devices, and instruments, have entered many a field to make it pos-

sible to contend with growing intricacy of operation. A modern bank, a modern factory or refinery could not operate without this mechanization. Sorting machines, automatic controls, applied power, and machines which make machines have enabled us to build our civilization to its present point of high individual productivity, interrelationship, and standard of living. But these things have hardly touched as yet the ways in which we store and communicate our findings and our thoughts.

New Methods of Publishing

Books and journals published for a limited group such as yours are bound to be expensive; they cannot be produced by conventional means at prices that are easy to bear. This fact tends to reduce further the size of the group that can have easy access to them, however essential to your profession may be the information they contain. True, there are devices being built which will greatly decrease the cost of printing on paper. The day of metal type, which has served so long, may be nearing an end. New electronic photocomposition machines are beginning to produce books, and this is by no means the final step in a revolution of methods of printing.

We also have microfilm. With some of the refined types of film developed during the war it is no exaggeration to state that the *Encyclopaedia Britannica* could be compressed to the size of a matchbox. There are all sorts of useful but not revolutionary card sorting processes and the cards can carry microfilm. There is a little used machine in existence—the rapid selector—which can review items on a strip of microfilm at the rate of 1,000 items a second and print those which are selected in accordance with a code set on a keyboard. It could, for example, review the case histories of half a million hospital patients in 10 minutes and present for aid in diagnosis printed copies of the few cases which corresponded to an unusual set of symptoms and complications. I say it could, but as yet it does not.

We might profitably give some attention to our methods of indexing and cataloging scientific literature. In an era of chemical physicists, physical chemists, biophysicists,

biochemists, neurologists, neuropathologists, neurosurgeons, clinical psychiatrists, and so on, it is difficult to know how our knowledge ought to be classified and how to thread our way through the classifications, once they are temporarily established, to find the information that we need.

The rapid selector mentioned above will select according to an established code, but the code must be developed on a rational principle so that it can be effectively operated. No system of coding or of indexing under established subject heads can efficiently serve to guide us through the written thoughts or findings of scientists when the very science in which they work will not submit to definition. We can only wish—the optimists among us may hope—that a way will be found for converting into some form of mechanism the kind of fluid indexing and cataloging that takes place in our minds. There is here a feature which man has not yet introduced into his machinery, a feature of great power, the pursuit of paths through a complex record by means of association of ideas. Modern electronics can do for us almost anything we ask in the way of rapid, involved operations upon masses of data. But we still tell our research findings to one another in much the same old way, and we record our research results in a mass of paper from which their extraction becomes increasingly laborious.

Two Lines of Practical Action

There are two very concrete things that we can do in the present situation that can help enormously.

In the first place, we can be intelligible. We can school ourselves—all of us—to express ourselves so that what we have to communicate can be quickly and easily apprehended by others within our profession and in the nearly related professions. There is, as has recently been said, a moral obligation upon all of us to be intelligible.

In the second place, we can gather, integrate, interpret. We can take measures to encourage a few at least within our professions who have the native skill to gather, summarize, and interpret the information developed by many workers—who can make great masses of seem-

ingly confused data clear, intelligible, and useful to their fellows. Men possessing this kind of skill are rare and need to be encouraged. In these hurried days their efforts in explaining where we are, where we are going, and what recent developments really mean, is utterly invaluable.

I said before that the most helpful thing that can be done to advance fundamental science is to find the truly gifted scientist and support him to the utmost. Let me repeat this for the individual who can integrate the current stream of emerging knowledge. Only too often his work does not receive the recognition it deserves, and his labors are performed at the sacrifice, not only of his own career in strictly novel research, but also of his scale of living, for the direct rewards of this sort of publication are not large. I wish there were more generous support for labor of this sort and more recognition for this type of attainment. Had I invented a new dynamite and reaped a fortune from it, I should be inclined to establish a Nobel Prize for the integrator and interpreter of science, who can in these days often serve his fellows far more

than the individual who merely adds one morsel to the growing, and often indigestible, pile of accumulated factual knowledge.

The dangers and difficulties which attend us as the pace of scientific research is quickened and the field of knowledge expands into many new paths . . . are real, and we would do well to devote deep thought to their avoidance and to finding solutions for the problems they present. Still, the most significant aspect of the present day in science is that we are going ahead energetically and accomplishing much. . . . It is far better that we should be embarrassed by the consequences of our rapid progress than that we should be bogged down to a snail's pace. Our problems of integration and interchange are solvable if we will devote enough of our energy to grappling with them. . . .

These are invigorating days in science and its applications. And if we can only avoid the disaster of another world war, I am convinced that we are on the threshold of great things, full of hope for a better future and a more healthy, happy race of men.

Five Reports on Psychosocial Aspects of Cancer

During the National Conference of Social Work sessions at Chicago in May 1952, the American Cancer Society sponsored discussions of the psychosomatic and psychosocial aspects of cancer under the general title, "Living With Cancer." *Public Health Reports* is publishing in this issue the fifth and final paper selected from these discussions—"The Aggregate Community Picture," by Edna Nicholson (see facing page 169). The four previously published papers are:

Professional attitudes and terminal care, by Charles S. Cameron, October 1952, pp. 955-959.

Typical patient and family attitudes, by Addie Thomas, October 1952, pp. 960-962.

Psychological impact of cancer surgery, by Arthur Sutherland, November 1952, pp. 1139-1143.

The sequence of emotional reactions in radical mastectomy patients, by Morton Bard, November 1952, pp. 1144-1148.

The Aggregate Community Picture

By EDNA NICHOLSON, M.S.P.H.

ATTITUDES are the source of action whether they are those of the individual or of a community of individuals. Community attitudes toward cancer are vastly important because of the ways in which they affect human suffering and what is done to relieve it.

Community-wide participation is essential if the necessary services and facilities are to be available. Effective provision of these services and facilities involves significant numbers of highly trained personnel, necessitates the spending of large sums of money, and requires good community planning and coordination.

Unless effective community provisions have been made, little can be accomplished either on a mass basis or in obtaining good diagnostic and treatment services for an individual patient. Provisions must include:

Research. Research does not consist of some form of magic. It does consist of endless hours of painstaking effort by highly trained personnel, working with specialized and often very expensive equipment in places where the necessary material is available, the facilities are adequate for their needs, and the funds are sufficient to meet the cost.

Education of professional personnel. Well-staffed, well-organized, and well-financed educational and training centers are essential if there are to be good doctors, nurses, social workers, health educators, laboratory and X-

ray technicians, and other essential personnel available when needed.

Education of the public. Not enough is known about cancer to cure all cases even though 'discovered early. But the number of persons dying for this reason is perhaps far less than the number who are suffering and dying because they did not seek care early, or did not present themselves to reliable physicians, or did not follow the advice they received at a point where it might have controlled the condition and saved their lives. Procrastination and quackery are making ready victims of cancer patients. Broad and effective community programs are needed to educate the public.

Hospitals and related facilities and equipment. Facilities are needed for diagnosis, for surgical care and other types of treatment, and for good care of patients, including terminal care. The size, complexity, and cost of these facilities and equipment are such that there is little or no possibility of providing them without broad community participation.

Coordination of services. To achieve the best possible care for patients and the most efficient use of community money, there must be provisions for coordinating the many specialized services which may be required for the individual patient and adequate machinery to achieve effective coordination in community planning and action. This need was sharply delineated in a recent study of terminal care for cancer patients. Intensive study of more than 5,000 cases in an urban area showed that, in general, almost enough facilities and services were available in the community to provide the necessary care, but that many patients were not receiving the care they needed because they did not know it was available, or because the patients needing

Miss Nicholson, director of the Central Service for the Chronically Ill of the Institute of Medicine, Chicago, presented this paper as a part of the American Cancer Society's program at the National Conference of Social Work held in Chicago, May 27, 1952.

the care and the resources available to provide it were not getting together. Deficiencies in community resources need to be clarified, unnecessary gaps and duplications eliminated, development of new facilities and services guided, and existing sources operated and used with effectiveness for the patients and economy in expenditure of community money.

Meeting the costs of medical care. Provisions must be adequate for persons unable to pay. At present we have far too many different public assistance programs responsible for financial help to needy people, with too much personnel and money being wasted in maintaining artificial distinctions between specialized, categorical programs. And almost all of them are operating on seriously inadequate standards in staff and services and in the assistance they are providing to needy cancer patients along with other dependent people.

Obviously, there are many factors which influence the adequacy with which any community provides the services necessary in the control of cancer and in the diagnosis, treatment, and care of persons suffering from cancer. Highly important among these factors are the attitudes with which the community regards cancer and its responsibility for meeting the problems related to it. There is nothing mysterious about community attitudes. They represent merely the aggregate of the attitudes of the individuals who make up the community. If most of the people in the community regard cancer with such fear or guilt that they cannot accept the problems calmly and plan wisely to meet them, these attitudes almost certainly will be reflected in poor community planning, disorganization, and inadequate services. If a majority of the individuals in the community are selfish and indifferent to the problems of people who are sick and in trouble, their attitudes will be evident in lack of effective community support and an inability to develop and maintain good services. Conversely, when a majority of the individuals in the community feel a sense of responsibility for their fellow men; when they are realistic and objective in facing facts; when they are moved by humane understanding and intelligent compassion, their community will have good services and the fullest advantage will be taken of all existing possibilities for the prevention

and control of cancer and for the diagnosis, treatment, and care of persons affected by it.

Fear of Cancer

One of the most prevalent and potentially damaging attitudes toward cancer is fear. The fear of an individual that cancer may strike him or that it may take away someone he loves is so widespread as to be almost universal. It may be a normal and perfectly intelligent reaction to reality. It is one of the strong factors which helps to motivate intelligent people to consult a physician and to follow his advice. It causes communities to provide the money and to take the action necessary to assure that good services and facilities are available for the management of cancer.

However, uncontrolled fear of cancer is likely to defeat the very purposes it should serve. Uncontrolled fear may be evidenced by refusal to face the facts and by consistent efforts to avoid all contacts with realities which must be faced if anything constructive is to be done about cancer. This results almost inevitably in a lack of sufficient services, inadequate support for good services, and poor planning—or no planning at all—in the development of new facilities and services.

Often fear of cancer results in such panic that there are intense demands for community action, but the demands are accompanied by such strong emotions as to make sound, realistic planning impossible. New facilities then may be developed blindly only to discover too late that they are not of the type suitable to meet the real need. Uncontrolled fear may be expressed in the form of a paralyzing hopelessness which makes it difficult or impossible to develop and maintain good community services.

Association of Guilt

Feelings of personal guilt are widely prevalent in the care of cancer patients. Usually, they arise from situations in which relatives become deeply disturbed by some failure, or imagined failure, in their past relationships with the patient. As they face the more or less imminent possibility of the patient's death they may be almost overwhelmed by their feelings

and may begin to reach out frantically for ways in which they can compensate for their failures and reassure themselves regarding their devotion to the patient and their general worth as human beings. These feelings probably are much more widespread than is generally recognized. Like fear, guilt may be so common as to be part of a normal reaction.

Some release for the feelings is essential. In many instances, of course, the individual is able to adjust to the situation with reasonable success. In others, however, he may be so driven by his feelings that he becomes excessively protective of the patient, oversentimental about all cancer patients, critical of the doctors, nurses, hospitals, and others in the community, and a source of disturbance in efforts to meet community problems. He may find others who share his emotional distress and his feelings of rebellion. Another "crusading" group in the community may be the result, guided by emotion rather than facts and acting on impulse without sound guidance—and sometimes in rebellion against sound guidance. Groups of this kind tend to spring up everywhere. Usually, they do not reach sufficient size nor have sufficient stability to achieve substantial results of any kind. They may endanger good community services, however, by diverting badly needed interest and support from those which have value to those which do not.

Bane of Self-Interest

It is an entirely normal reaction for each individual to consider, first, his own comfort and security. It is not surprising, therefore, that self-interest is found in community services for the management of cancer just as it occurs elsewhere in human life. There are varying degrees, however, in the attitudes of individuals and communities toward their fellow men. In some the prevailing attitude seems to be one of indifference—or even of censure—for people in trouble. Where little, if any, feeling of community responsibility for people who are hopelessly sick and dependent exists, it is difficult or impossible to develop and maintain good community services.

In other places, the situation seems to be only slightly better. These communities may not

be able to ignore their responsibilities completely. They may enact laws making legal provisions for the care of sick or helpless people, but, because they are not willing to make real sacrifices of their own comfort and security, they may give so little financial and other support to the programs that the laws have little effect.

In some communities, various civic and professional groups may deplore the absence of good community services but be unwilling to submerge their own vested interests sufficiently to achieve effective, well-rounded community action. Social workers criticize physicians for not supporting a plan which the social agencies develop. Hospitals and doctors criticize the social agencies. Businessmen and labor leaders are critical of all of them. And while each is blaming someone else because the community does not have the facilities it needs, no one is submerging his own particular interests and point of view long enough to make an honest effort to understand the problems of the others; and the people who desperately need care continue to be left without it.

There is another aspect of self-interest which also may endanger good community services for cancer patients. Often it is a subconscious type of self-interest buried under an apparently sincere and zealous devotion to the development of good health and welfare services in the community. There are persons and organizations who sponsor a "cause" in an effort to gain social prestige. There are others who are hungry for personal glory and power and are willing to work hard for good community services only so long as they can dominate them and receive widespread credit and publicity for their good deeds. These people and groups in the community often are motivated by self-interest of this kind without fully recognizing it. They may believe themselves to be concerned sincerely for the welfare of the people they supposedly are serving.

Constructive Attitudes Toward Cancer

Fortunately, in every community there are attitudes which have constructive effects upon the development and maintenance of good community services. In all communities these

attitudes are present to some extent. Even in those places where they seem to be overshadowed by less wholesome attitudes, it is probable that they can be found in some degree and, with care, can be increased to a point where eventually they predominate in controlling community action.

In any effective effort to assure good facilities and services to meet the problems presented by cancer, it is important that such attitudes characterize the planning and action of the community.

A sincere sense of responsibility for helping people who are sick and in trouble implies more than a sentimental desire to relieve suffering. It includes a broad responsibility for assuring that real, practical help of good quality and adequate amount actually is provided and kept consistently available.

A realistic acceptance of the importance of factual information with careful analysis of problems, sound planning, and consistent long-range effort is essential. The problems which now stand in the way of good community facilities and services for cancer patients have been growing for many years. They are deeply rooted and are intertwined with many other health and welfare problems in the community. If they are to be solved, there must be accurate information about what the problems really are; how much is being done to meet them; what specific factors are operating to cause the existing deficiencies; how these factors can be overcome; specifically what new facilities and services are needed and how many; where they should be located; how they should be operated; what their relationship should be to other essential community services; and how these facilities and services can be financed. These patients have waited too long, and their needs are too desperate, for us to fail them now by not accepting the need for clear thinking and long, hard work.

There are many individuals and many communities who would like to have better facilities and services available for cancer patients. Too often, however, their desire for these services is spasmodic and does not go deep enough to accept and meet the necessity for assembling and analyzing factual information to clarify the needs, for formulating effective plans for

meeting them, and for working consistently over long periods of time to assure that the needs are met. Instead, they tend to seize upon whatever idea presents itself on the spur of the moment and to base their actions upon superficial thinking and too few facts.

It is under circumstances such as these that communities fail to distinguish clearly between a need for more beds for cancer patients and a need for more adequate funds to pay for care of patients in beds which are available. This type of approach may lead to the development of specialized hospitals and related institutional facilities exclusively for the care of cancer patients, when closer integration of cancer facilities with general hospitals and medical centers might provide better services and entail less cost to the community. The same approach may be responsible for the "pesthouse" type of planning which establishes separate institutions exclusively for terminal care of cancer patients. All of these things may be done with the best possible intentions. Certainly, good intentions are greatly needed. They must be supplemented, however, with a realistic understanding of the need for facts and clear thinking.

Understanding and acceptance of the emotional aspects of human behavior and the emotional requirements of the individual is another community goal. We have tried too often to choose between intelligence and emotion on the assumption that these two qualities necessarily are antagonistic. Yet, the human being is an indivisible combination of both qualities, and there is no way in which human needs can be met adequately without consideration for both.

For humane reasons, the emotional effects of various types of facilities and services must be fully considered. Because of the strong influence of emotions on human behavior and on the ways in which community services are used by people in need of care, it is essential also for very practical reasons. It is unrealistic to attempt to plan community services without consideration of the probable emotional reactions of the patients, their families, and the community to the various types of services under consideration. Similarly, intelligence must be used if there is to be any hope that the services will be stable, well-operated, and effective.

Statistics in a Health Department

Medical Care Plan

By MATTHEW TABACK, A.M., and HUNTINGTON WILLIAMS, M.D.

THE FUNCTION of statistics in the sense of analysis of collected data and the methodology for data collection will be discussed in this paper in relation to three phases of medical care administration: (a) formulation of the initial medical care plan and its close guidance during early operation and subsequent development; (b) determination of patterns of utilization of services, including statistics on failure to use, as well as injudicious use of medical care benefits; and (c) determination of quality of medical care. Medical care statistics as indexes for planning and administration have been stressed elsewhere (1).

Health Departments and Medical Care

Due to the success of health departments and medical research in communicable disease control and as a result of the recent marked declines in infant and tuberculosis mortality, prevention and control of disease among the indigent through provision of early and comprehensive medical care has become increasingly a responsibility of the local health department. Consistent with this trend, the Association of State and Territorial Health Officers in 1950 officially requested that administration of public medical care programs be placed under the official health

agency (2). Thus by 1950, Terris and Kramer (3) report, "62 or 5 percent of all full-time health departments have responsibilities for administering general medical services of varied scope and character."

The medical services most commonly provided are those of the physician in the home, clinic, or office and the provision of drugs and laboratory services. The geographic coverage of these health department administered programs varies from Maryland's state-wide plan for relief clients and medically indigent persons to programs covering small counties and cities of approximately 25,000 population.

The medical care programs in Maryland represent the result of intensive investigations by the Committee on Medical Care of the State Planning Commission during the period 1940-46. Following separate studies of the medical needs and resources of the counties of Maryland and of Baltimore City, two distinct and administratively independent programs were established. Both county and city programs are concerned with indigent persons and are founded upon the concept of family coverage for specified periods of time.

Baltimore City Program

The persons covered by the Baltimore City medical care program initiated in 1948 are referred by the welfare department to the health department. Assignment for medical services, regardless of any stated need, is made by the health department to an appropriate medical care clinic. Cooperating with each of the six medical care clinics is a panel of physicians, one

Mr. Taback is director of the bureau of biostatistics and Dr. Williams is commissioner of health, Baltimore City Health Department. This paper was presented June 20, 1952, at the Second Conference on Public Health Statistics, School of Public Health of the University of Michigan, Ann Arbor (see Public Health Reports, August 1952, p. 725).

of whom is selected by a representative of the family. The family has free choice of physician and the physician retains the right to refuse to accept as patients any family. The manner in which services are rendered is shown in table 1.

Two points should be emphasized. The population covered is always known both in numbers and in detailed characteristics. The health department is primarily responsible for integrating the program; it has very little responsibility for providing services directly.

In view of the initial size of the program (population to be covered estimated at 21,000), it was decided to establish in the medical care section a statistical unit responsible for advising the medical care program. This unit receives technical assistance from the bureau of biostatistics and concerns itself with the accumulation of data required for evaluation and program analysis as well as with maintenance of the records system for disbursement of funds.

Benefits to patients and cost per service are two basic concepts fundamental to any assessment of a medical care plan. The success of such a plan can be measured by the extent to which it meets the essential medical needs of the population to be covered and by the amount and quality of services rendered per specified unit of money expended. Several procedures which

assist in the guidance of a program providing maximum patient benefit at minimum cost are described.

Indexes for Planning

A medical care program must be tailored to fit the population to be covered. In figure 1, the population of the United States, by age, is contrasted with the group covered by the Baltimore City medical care program and the enrolled members of the Health Insurance Plan of Greater New York (4). The indigent population of Baltimore has an extremely high proportion of persons at each end of the age scale, with a resultant low level in the middle-age categories. Compared with the general population, Baltimore has few persons in the young and middle-adult period. Note the opposite pattern in the age profile for the Health Insurance Plan, in which the adult ages predominate and persons in the older ages are few in contrast to the general population.

An examination of the age characteristics of the group covered by the Baltimore City medical care plan shows that the needs of a public assistance group are particularly associated with the problems of the aged, and in addition should provide an extensive preventive and pediatric service for the large numbers of children found in this group.

Analysis of the race and sex characteristics of the public assistance population (table 2) reveals a markedly different distribution than that of the community. Table 3 shows a definite excess of Negroes in the medical care group at most age levels, and significant concentration of females for the adult ages, suggesting a pattern of medical need associated with conditions commonly found among Negroes and among women.

A knowledge of the environmental and socioeconomic circumstances of the population to be covered by a medical care program furnishes useful information on the capabilities of the beneficiaries to assume responsibility for the care of ill members in the home or to benefit from health education efforts.

Figure 2 indicates the geographic characteristics of the covered population. White persons appear to be widely distributed throughout the city, with a small number of concentrated

Table 1. Agencies providing medical services and method of payment, Baltimore City medical care program

Agency	Services provided	Method of payment
Private physician.	General care in the office or home; day and night.	Capitation: \$7 per person referred per year.
Medical care clinic.	General examination, diagnostic and special therapeutic services.	Capitation: \$10 per person referred per year.
Neighborhood druggist, hospital pharmacy.	Preparation of prescriptions as written by participating physicians.	Fee for service: based on wholesale cost of ingredients plus service fee.
Health department.	Clinical services: well-baby, prenatal, tuberculosis, venereal disease.	Free.

PERCENT OF POPULATION PER YEAR OF AGE

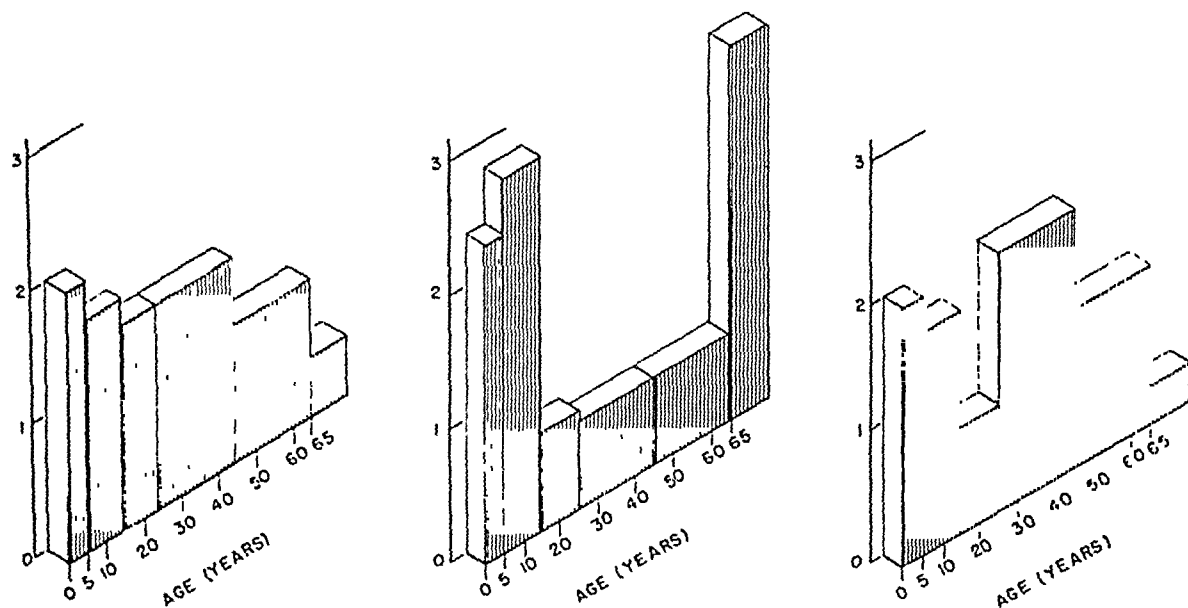


Figure 1. Distribution of selected populations, by age.

foci; the nonwhite medical care group is densely concentrated in the hub of the city.

Detailed housing statistics by census tract reveal the slum conditions in which the Negro group resides. Data on density of households indicate extreme crowding. With a few exceptions, the environmental circumstances of a considerable proportion of white covered families are more favorable than those of the Negro family units.

The limitation which the medical staff must expect in capabilities of patients for modification of the location or nutrition of the family is clearly demonstrated by the family budget. In 1950, according to an estimate of the Bureau of Labor Statistics (5), an elderly couple required an annual income of \$1,779 to maintain a modest standard of living. For elderly couples in the medical care program, who are dependent on welfare department grants, the current average income per couple from all sources is \$1,134, considerably less than that considered sufficient.

Estimation of Medical Needs

In developing the detailed organizational framework for administration of a service program, some estimate is necessary of the utilization

expected within a given pattern of providing care. Especially is this true for programs predicated largely on a capitation principle. Underestimates of utilization may cause hardship and dissatisfaction among the participating physicians. Excessive overestimate will result in a distribution of public funds which cannot be defended in budget reviews.

Several lines of attack on this problem were available at the initiation of the Baltimore City medical care program. The experience since 1948 both in health department programs and in such units as the Health Insurance Plan of Greater New York provides more recent information for planning purposes.

In considering an indigent urban population, it is well to recall that a principal source of medical service is the hospital out-patient department. A check of services to indigents during a prescribed period of time, when related to the known population of such persons, provides an estimate of utilization of clinical services as well as of their distribution by type.

Although 20 years old, the findings of the Committee on the Costs of Medical Care have great potential value as first approximations of expected volume of medical services in a com-

Table 2. Percentage distribution of population by race and sex, total Baltimore City and persons covered by Baltimore City medical care program

Population	Total	White			Nonwhite		
		Total	Male	Female	Total	Male	Female
Baltimore City (1950)-----	100	76.2	34.3	41.9	23.8	10.7	13.1
Baltimore City medical care program (1951) -	100	26.3	10.4	15.9	73.7	29.0	41.7

prehensive program. In one of the committee's investigations, Falk, Klem, and Sinai (6) present information on services received during a 12-month period, according to family income. Utilization of the higher-income groups in this study represents a reasonable basis for expected utilization in a health department sponsored program. Baltimore has been fortunate in serving as an area for a 5-year study of causes of illness and utilization of medical services conducted during the period 1938-42 (7, 8). This type of investigation provides data of inestimable value and accuracy. Care must be taken in applying such material to populations with unusual distributions in respect to age and race; but with appropriate correction, observations made from such surveys furnish another

source of information upon which an estimate of utilization may be based.

Survey of Medical Resources

In formulating the initial medical care plan, it is necessary to determine whether the medical facilities are sufficient in number and properly disposed to meet the objectives of the program.

The blueprint for the Baltimore City medical care program places in the hands of the general practitioner the means to provide basic medical care for all covered families. One of the first tasks, therefore, was to determine the distribution of physicians in general practice with respect to location and number.

Analysis of the physician-per-population ratio in the white component of the community

Table 3. Persons covered, according to age, race, and sex, Baltimore City medical care program, July 1951

Age group	Total			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Number									
All ages--	22,744	8,967	13,777	5,974	2,370	3,604	16,770	6,597	10,173
0-4--	2,692	1,396	1,296	411	213	198	2,281	1,183	1,098
5-14--	6,334	3,185	3,149	1,147	562	585	5,187	2,623	2,564
15-24--	1,841	606	1,235	263	100	163	1,578	506	1,072
25-44--	3,241	486	2,755	665	160	505	2,576	326	2,250
45-64--	3,184	1,249	1,935	905	411	494	2,279	838	1,441
65 and over--	5,452	2,045	3,407	2,583	924	1,659	2,869	1,121	1,748
Percent									
All ages--	100.0	39.4	60.6	100.0	39.7	60.3	100.0	39.3	60.7
0-4--	11.8	6.1	5.7	6.9	3.6	3.3	13.6	7.0	6.6
5-14--	27.9	14.0	13.9	19.2	9.4	9.8	30.9	15.6	15.3
15-24--	8.1	2.7	5.4	4.4	1.7	2.7	9.4	3.0	6.4
25-44--	14.2	2.1	12.1	11.1	2.7	8.4	15.4	2.0	13.0
45-64--	14.0	5.5	8.5	15.2	6.9	8.3	13.6	5.0	8.6
65 and over--	24.0	9.0	15.0	43.2	15.4	27.8	17.1	6.7	10.4

(table 4), as well as the geographic distribution of white practitioners, suggested no particular problem. The prevailing pattern of home and office care is such that white physicians provide care to white families and Negro physicians provide ambulant services to nonwhite families. A large proportion of indigent families received the equivalent of home and office care in the hospital out-patient departments prior to the establishment of the Baltimore City medical care program.

The story was vastly different for the non-white group. Not only was there an unfavorable ratio of physicians to population served, but the geographic distribution suggested that great difficulty would be experienced in finding personal Negro physicians for the families to be covered by the program. As a result of this analysis, attempts were made to attract new physicians into areas where a large-scale need existed.

Similar studies established the adequacy of clinical facilities in general hospitals and of neighborhood pharmacies, so that no unusual problems ensued in obtaining services of these agencies.

Indexes for Program Control

Progressive medical care administration must be based on a thorough understanding of the specific disease entities which a group presents. Information available from selected studies of out-patient records, morbidity studies, and discussions with physicians familiar with a given population segment provides a working basis for initial planning. However, as soon as possible, accurate and complete data on the conditions presented by a covered population should be obtained.

The Baltimore City medical care program provides for a general examination by one of the medical care clinics for every person referred to it. The results of this thorough medical survey yield invaluable statistics concerning the amount, classification, and severity of medical problems presented by an indigent population. A summary of this type of data is shown in table 5. However, some qualification is necessary. The persons included in this summary represent an unbiased sample of adults who have completed examinations at one of the participating medical care clinics. Although

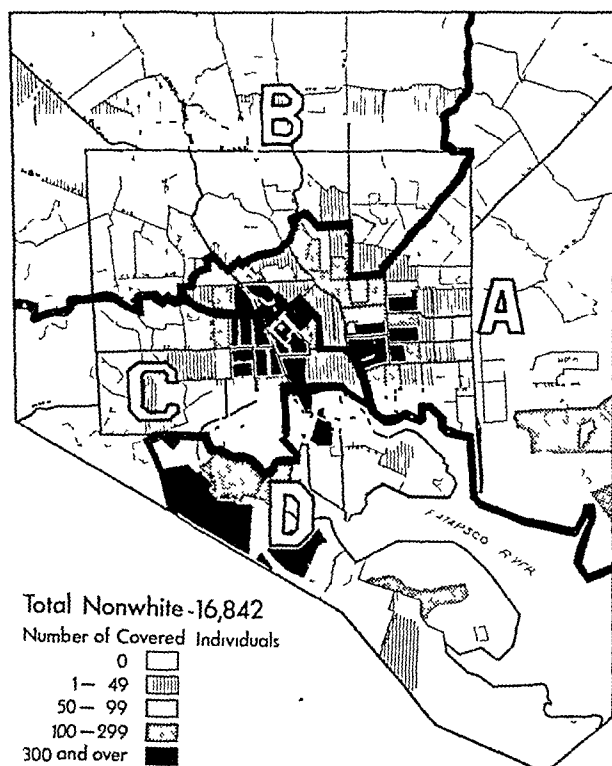
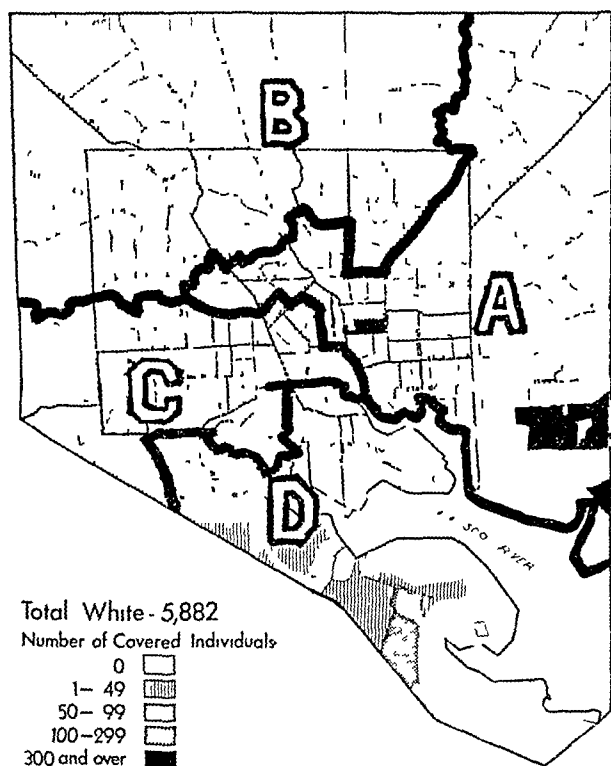


Figure 2. Population covered, by race and census tract, Baltimore City medical care program, 1951.

Table 4. Distribution of population and general practitioners, by race, Baltimore City, 1948

	Total	White	Non-white
Total population.....	943, 000	729, 000	214, 000
General practitioners.....	1, 120	1, 040	80
Physicians per 1,000 population.....	1. 19	1. 43	. 37
Population per physician....	842	701	2, 675

all persons registered at the clinic are scheduled for examination, approximately 12 percent fail to avail themselves of this privilege. In presenting the information available from the clinic histories selected, use has been made of the Sixth Revision of the International Lists of Diseases and Causes of Death, adopted in 1948, and a modification of the classification recommended for morbidity purposes has been employed.

The data in table 5 reveal a striking amount of disease diagnosed. (The high place of venereal diseases and diseases of the female genital organs would seem most unusual were it not consistent with early conclusions, drawn on the basis of population analysis.) However, the health administrator needs more information than the diagnosis alone provides. To assist

him in interpreting the data, the examining physician should supply, in addition to his diagnosis, information as to what limitation the patient's condition will impose upon his daily capabilities to perform useful work.

When the data in table 5 are further classified as to whether the diseases are disabling or not, they may serve as a basis for estimating requirements for specialists' and laboratory services. Any program for postgraduate instruction should seek to assist cooperating physicians in effective management of the more prevalent disabling conditions.

The study of clinical histories of the individuals included in this investigation showed that 850 or 87 percent of the persons examined had previous hospital or out-patient records, many of which were extensive in detail. Such records are believed to be characteristic of urban indigent groups and suggest that there should be some compromise with the concept of a complete physical examination for each individual in a medical care program.

Patterns of Utilization

In developing capitation fees, utilization rates were estimated from national as well as local surveys. In view of the unique distribution of care in the Baltimore City medical care

Table 5. Principal disease groups observed in general examinations of 975 indigent persons, aged 15-64 years, Johns Hopkins Medical Care Clinic, 1950¹

Disease groups ² (listed in order of total prevalence)	Total prevalence		Previously diagnosed		Newly diagnosed	
	Number	Per 100 examined	Number	Per 100 examined	Number	Per 100 examined
Arteriosclerotic and degenerative heart disease (420-422).....	254	26. 1	187	19. 2	67	6. 9
Venereal diseases (020-035).....	184	18. 9	163	16. 7	21	2. 2
Diseases of digestive system (530-559) (571-587).....	134	13. 7	60	6. 1	74	7. 6
Arthritis and rheumatism (720-727).....	112	11. 5	80	8. 2	32	3. 3
Diseases of female genital organs (620-637).....	109	11. 2	56	5. 8	53	5. 4
Psychoneurosis and psychosis (300-326).....	104	10. 7	94	9. 7	10	1. 0
Diseases of the eye (370-379).....	87	8. 9	68	7. 0	19	1. 9
Hypertensive disease (440-447).....	79	8. 1	59	6. 1	20	2. 0
Other diseases of the circulatory system (450-468).....	78	8. 0	41	4. 2	37	3. 8
Bronchitis and other respiratory diseases (500-527).....	77	7. 9	39	4. 0	38	3. 9
Diabetes mellitus (260).....	51	5. 2	45	4. 6	6	. 6

¹ Histories and examination results were evaluated by Drs. George Dana and George Brown, of the Johns Hopkins Medical Care Clinic.

² Figures in parentheses are International List numbers.

program, it has been necessary periodically to assess the extent to which facilities have been used by the covered population. In achieving this objective, it has been a standard procedure to develop suitable statistics from records which are essential for medical management or from an administrative point of view. Thus, clinic and drug utilization are determined by a study of the clinical histories and drug invoices for a systematic stratified sample of the covered population. Physician utilization studies are dependent upon the accuracy with which physicians check on a quarterly patient roster the number of visits made and have been somewhat difficult to accomplish because of the incompleteness of data provided. Nevertheless, the rough approximations which have been possible are administratively very worth while.

From the 1949-50 experience, utilization rates of benefits offered under the Baltimore City medical care program are shown in table 6.

By determining the amount of money which would be required to provide the services performed by the general practitioner if a fee for service were paid, it is possible to evaluate the correctness of the capitation fee. A similar mode of study is possible in regard to the clinic role in the program.

Age specific rates of utilization of services are often of great value in pointing out which segments of a covered population are the most costly elements. They assist also in planning extensions of the program to additional groups. An example of this type of data is shown in table 7.

Several other descriptions of utilization of services are worthy of mention, such as distribu-

Table 6. Utilization of services provided to eligible persons under the Baltimore City medical care program, fiscal year 1950

Type of service	Number
Physicians' visits per capita per year.....	2. 4
Office.....	1. 5
Home (day).....	. 7
Home (night).....	. 2
Clinic services per capita per year.....	2. 2
Registration and screening examinations...	. 25
General examinations.....	. 25
Clinic services (diagnostic and special therapy).....	1. 70
Prescriptions per capita per year.....	3. 1

Table 7. Utilization of drugs, by age groups,¹ Baltimore City medical care program, fiscal year 1950

Age	Number of persons	Number of prescriptions	Total cost	Annual per capita utilization	
				Number of prescriptions	Cost
Total.....	1, 554	4, 800	\$7, 084. 06	3. 1	\$4. 56
0-4.....	90	89	100. 80	1. 0	1. 12
5-10.....	513	359	511. 42	. 7	1. 00
20-39.....	180	460	667. 25	2. 5	3. 71
40-59.....	198	1, 205	1, 788. 83	6. 1	9. 03
60 and over.....	573	2, 687	4, 015. 76	4. 7	7. 01

¹ Based upon a systematic stratified sample of persons assigned on July 1, 1949.

tion of persons by length of membership in the program and by number of services received.

Recent analysis of length of stay on the program indicates a 25-percent reduction in need for clinical services during the second year of registration, indicating in part the advisability of developing a stable program of care for any population group.

On occasion, a distribution of individuals according to number of services received has been most illuminating. Using such a classification, it may prove possible to encourage a thorough review of a small number of persons who are receiving a markedly disproportionate share of total services provided in a given time period.

Failure to Use Services

In assessing the manner of utilizing program benefits a group which fails to respond by initial registration or to appear for general examination constitutes a problem which requires study. The administrator is not trying to create unnecessary activity. Rather he desires to introduce the concept of early care and prevention to a group of families who may not appreciate the value of preventive measures.

During the early operation of the Baltimore City medical care program, it was found that approximately 40 percent of the families failed to respond to notification to register at one of the medical care clinics. Analysis of the age, sex, and race characteristics of this group did

not indicate any striking difference from the equivalent statistics for the total of persons assigned. It was decided, therefore, to conduct a systematic inquiry of the response pattern of a block of families assigned to one of the clinics. The results of this investigation are shown in table 8.

As a result of this investigation, and after a careful study of the reasons for nonresponse noted by public health nurses, who were used on a trial study basis, a successful pattern of contacting families has been evolved, eliminating the nonregistrant group as a significant segment of the medical care population.

Variability in Utilization Patterns

In any medical care program, a range of patterns will develop, in addition to some average tendency. One of the most useful techniques in the application of statistics to operation analysis is the description of variability in utilization patterns in a manner which permits a value judgment and leads to an administrative decision.

Some of the practices which have been critically analyzed and which should be of interest to any administrator are:

1. Prescription-per-visit ratio according to physician.
2. Physician referrals for consultation per 100 person-years' coverage.
3. Percentage distribution of prescriptions classified proprietary or nonproprietary.

Table 8. Registration pattern of a block of assigned persons, according to notification procedure, Sinai Medical Care Clinic, 1949

Notification procedure	Total persons notified	Number registered	Registration per 100 persons notified	Cumulative per cent registered
Introductory card including appointment	879	537	61.1	61.1
Follow-up form letter including appointment	468	153	32.7	78.5
Nurse's visit	106	76	71.7	87.2

Determination of Tolerance Limits

If C = Total annual prescription cost

c = Cost of a single prescription

N = Total annual number of prescriptions

n = Annual number of prescriptions filled in a single pharmacy

Then $\mu = C/N$ and $\sigma = \sqrt{\frac{\sum c^2}{N} - \mu^2}$

and $\mu \pm 3\sigma/\sqrt{n}$ = Limits within which the mean prescription cost of an individual pharmacy with an experience of size n may be expected to vary by chance from the mean, based on the total experience.

4. Error rate in billing, according to pharmacist.

5. Mean cost of prescriptions, according to pharmacist.

No doubt there will be other indexes which will warrant study, depending upon the organization of the program for providing services. It is beyond the scope of this paper to demonstrate the techniques of using each of these indexes to point out patterns of possible injudicious use of the program's benefits. It will be of interest, however, to show how the analyses of data on two of these items contribute to reductions in the cost of administration.

Because the cost of drug service constitutes approximately 25 percent of total expenditures in the Baltimore medical care program, and because it was suggested that use of nonproprietary preparations whenever possible could result in significant savings, an analysis was undertaken of a systematic sample of prescriptions processed in the fiscal year 1951.

The proportion in each drug classification which proprietary drugs bear to the total varied within wide limits, representing over all 55.4 percent of the total prescription experience. The proprietary drugs were then submitted to a physician-pharmacist team who, with the guidance of a statistician, classified the prescriptions with reference to an official alternative and indicated the approximate saving in

cost. The results of this evaluation are shown in table 9 and indicate that \$16.30 per 100 proprietary drug prescriptions would have been saved if complete use had been made of the United States Pharmacopeia (10) preparations. When considered in terms of the total drug experience, this saving is equivalent to a 6-percent reduction, or \$9,000, for the volume encountered in the fiscal year 1951, during which the drug bill of the Baltimore City medical care program was \$150,000.

Procedures Useful in Cost Control

Basic medical and drug services are provided by some 300 physicians and 500 pharmacists cooperating with the Baltimore City medical care program. The mean number of patient visits per 100 persons on a physician's list will vary with each physician. Reports by drug-gists will vary, among other things, in the average cost of prescriptions filled in their establishments.

To discover differences in practices of pharmacies within the drug program, variations in mean cost per prescription were studied, using the procedure shown in the accompanying box.

Pharmacies filling 100 or more prescriptions annually were regarded as unbiased samples of the total annual prescription experience having known mean and variance. Individual pharmacy differences from the total mean were evaluated in terms of the tolerance limits established.

A detailed study was made of invoices submitted by pharmacies with mean prescription costs lying outside of expected limits. In a few cases, the differences appeared to stem from an unusual character of the sample. In some instances, however, this technique proves useful in uncovering consistent deviations from standard cost practices. Such deviations can be obtained in either direction and are of equal interest so far as cost analysis is concerned.

Determination of Quality of Medical Care

In assessing the quality of a medical care program, it is necessary first to seek a definition of the characteristic to be measured. A definition which provides for no possible method by which the attribute "quality" can be quantitatively fixed will lead into a blind alley. How-

Table 9. Distribution of proprietary drugs by number and by cost status of equivalent United States Pharmacopeia preparation, Baltimore City medical care program, fiscal year 1951

Drug group	Total number proprietary prescrip- tions	Status of U. S. P. equivalent				Saving per 100 proprietary prescrip- tions
		Number not available	Number available			
			Number without cost saving	With saving		
				Number	Cost difference	
Total.....	573	193	177	203	\$93. 50	\$16. 32
Allergy preparations.....	28	20	4	4	4. 60	16. 43
Analgesics.....	64	30	19	15	6. 65	10. 39
Antibiotics and sulfonamides.....	31	13	3	15	8. 70	28. 06
Cardiovascular drugs.....	80	20	38	22	12. 75	15. 94
Dermatological preparations.....	17	14	2	1	2. 00	11. 76
Genitourinary preparations.....	9	6	2	1	. 30	3. 33
Gastrointestinal preparations.....	72	26	34	12	5. 25	7. 29
Hematics.....	17	2	5	10	9. 50	55. 89
Hormones.....	4	2	1	1	. 30	7. 50
Hypnotics and sedatives.....	35	2	12	21	6. 75	19. 29
Narcotics.....	21	9	12			
Respiratory preparations.....	101	15	21	65	20. 85	20. 64
Tonics and placeboes.....	27	11	6	10	3. 45	12. 78
Vitamins.....	26	11	2	13	10. 55	40. 58
Supplies and sickroom aids.....	21	2	19			
Other.....	20	10	7	3	1. 85	9. 25

ever, in developing this new scale, broad measurement intervals will suffice until experience permits a finer scale. Necessary conditions are:

1. A standard based on total patient benefit.
2. Until such a standard is developed, a criterion based on program components. This criterion should include measurable attributes, such as performance of physicians, accuracy and completeness of medical care records, and accuracy of laboratory determinations.

3. The availability of resources is a limiting factor in performance and should be considered when interpreting quality measurement.

One attempt has been made to establish criteria which would allow for an evaluation of therapy employed in the Baltimore City medical care program insofar as data on drug prescriptions can provide information on this subject. By conference with an expert committee, a classification was devised which distributes prescriptions according to their therapeutic advisability. The principal considerations involved in establishing the classification were: (a) therapeutic, chemical, and pharmaceutical compatibility of ingredients; (b) rationale of treatment, considering the condition involved and the patient's age; and (c) availability of more effective drugs.

The results of this study are in process of analysis and will be reported later.

Conclusions

Statistical methods represent an efficient way to gather information and to make it useful for administrative decision.

The particular contribution of the statistician to problems of administrative analyses as these analyses concern determination of quality lies in the development of well-defined classifications of performance with previously assigned values.

Built into the program from the start was a statistical study unit. The work is going forward for approximately 3 percent of the city's population who receive public assistance, with continued attention given to the guidance that may be derived from statistical analyses. The administration considers such "chart and compass" facilities to be indispensable.

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Selective Case Finding in Syphilis Control

By GEORGE MOORE, M.D., M.P.H., and MALCOLM T. FOSTER, M.D., M.P.H.

IN VIEW of the gradual decline in the number of cases of syphilis reported by State health departments year by year, most public health authorities have been aware of the need for radar-like methods to pinpoint undiscovered syphilitics in the population. Evan Thomas (1) has suggested that when the prevalence rate of syphilis is low, blood-test screening of total populations is not entirely feasible. As the incidence of syphilis in the population decreases, the cost of finding a case by mass blood-testing increases proportionately. In recent years, mass blood-testing campaigns have been waged in many of our major cities, such as Charleston, S. C. (2), Philadelphia, Pa. (3), Atlanta, Ga. (4), Detroit, Mich., and New York City. Because of variable results and high initial costs, the more recent surveys have emphasized screening of high-prevalence groups or areas rather than entire populations. The selective approach has proved its merit; nevertheless, the campaigns have required considerable personnel, effort, and money. They have also proved to be short-range procedures, as the populations tested are usually prone to reinfection.

Several States, notably Mississippi and North Carolina, have recently become interested in long-range, selective, group-screening methods. In Mississippi (5), the State Board of Health has considered placing emphasis on the population for survey rather than on the individual. They point to surveys as an effective method of

finding cases of late and congenital syphilis at low cost. Better education is also listed as an advantage.

In North Carolina, the State Board of Health has organized a venereal disease survey team consisting of six to eight trained Public Health Service investigators. At the request of a county health department, this team arranges and conducts blood-test surveys of select-group populations. Drs. Wright and Sheps (6), of Chapel Hill, N. C., discussing screening methods, suggest that the major value of such surveys is to reduce the backlog of old cases and to prevent congenital syphilis.

Interest is being shown in the sociomedical aspects of venereal disease more than ever before, and it is natural that this interest should enter the realm of screening methods. For example, H. Garrick Williams (7) describes his experiences with blood testing in pool halls and taverns, where 12.8 percent of the persons tested were reactors. W. Lloyd Warner and associates (8) have studied syphilis prevalence and community structure, using as their material a blood-testing campaign in a Georgia town. They found 0.6 percent white and 13.6 percent Negro reactors, and determined that groups with a lower social status contributed the highest percentage of positives. The authors write, "It is important that groups of the population with higher prevalence and incidence rates be identified so that activities can be directed toward them. . . ." Other authors have pointed out the effect of socioeconomic factors and marital status on syphilis prevalence (9, 10).

This paper describes briefly three methods of screening employed by the Cumberland County Health Department during the past year. These

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methods suggest long-range blood-test surveys, aimed at high-incidence groups, that can be adapted to most local health departments because of the limited cost and unnecessary "extras."

Diversified Industrial Surveys

From October 19, 1951, to June 15, 1952, the venereal disease division of the Cumberland County Health Department, consisting of two investigators, one clerk and the venereal disease control officer, visited 36 small industrial plants and, at semiweekly intervals, the county jail. The plants were selected for their unskilled and semiskilled employees, regardless of race, and included laundries, fertilizer plants, construction groups, city sanitation units, feed mills, coal and fuel companies, lumberyards, foundries, cement works, and brickworks, as well as the 654 county jail prisoners.

Plants employing over 50 men were not included in the survey, as arrangements had been made for the State venereal disease survey team to visit the county later. The time required for the surveys averaged about 1 hour a week for each of the four members of the venereal disease division. Thus, the survey fitted into the usual routine of venereal disease control work and caused no interruption of regular activity of the division. In fact, a diversified activity was begun which proved to be highly profitable.

A total of 1,483 persons was tested serologically in the 8-month period. Negroes comprised 57 percent of the group (the percentage of Negroes in Cumberland County is approximately 26 percent); 82 percent were males. By age, 54 percent were 15-30 years of age and 46 percent were 31 years and older. Table 1 illustrates the results of the survey.

Of the 244 positive or doubtful reactors, 221 or 91 percent have been brought to diagnosis. Eighty-six or 39 percent were found to need treatment. Twenty-six had late latent syphilis; 8 tertiary syphilis; 1 was a congenital syphilitic; and 51 were treated for early latent syphilis. It was significant that although 54 percent of the total group tested was comprised of youths between 15 and 30 years of age, the percentage of those in the same age range who

were found to need treatment was only 18 percent. Of the treated syphilitics, 82 percent were 31 years and older.

Eleven-Day Industrial Survey

From June 17 through June 28, 1952, the State venereal disease survey team invited by the Cumberland County Health Department completed a survey of the larger industrial plants (over 50 employees) in the county. All arrangements for the survey, including publicity, scheduling of plants, and conferences, had been made before the team's arrival. Schedules were presented at a short meeting with the team on June 16, and the survey began the next morning.

During the 11-day period, 2,360 serology tests were taken covering 37 industrial plants and special groups. The plants were of the same general description as listed for the first survey but also included textile mills, large manufacturing plants, and migrant fruit pickers. The composition of the group tested and the number of serologic tests for syphilis (STS) taken are shown in the accompanying tabulation.

<i>Survey group:</i>	<i>STS taken</i>
Industrial surveys.....	2,029
Migrant labor.....	49
Street surveys.....	205
Movies 3).....	77
Total	2,360

¹ 68 tests hemolyzed, or quantity not sufficient, or broken in shipment.

The group was weighted in favor of males (77 percent) and whites (56 percent). Forty-five percent of the group were 15 to 30 years old; 37 percent, 31 to 35; and 18 percent, 46 to 70. Results of the survey are shown in table 2.

By age, the group that demonstrated the highest percentage of positives for the Negro race was 31-45 (35 percent); the highest group for the white race was aged 46-70 (5 percent). The 15-30 age groups of both whites and Negroes proved to be the least infected groups. By sex, more Negro males in the 46-70 age group were infected (33 percent) than Negro females in the same age range (17 percent), showing that infected Negro females were younger than infected Negro males. Of 152

reactors that have already been brought to disposition, 88 or 58 percent have required treatment for syphilis; 3 percent were biological false positive reactions. The 88 diagnosed as active syphilis were distributed as follows:

Stage of syphilis:	Number	Percent
Early latent, not previously treated	16	18
Early latent, reinfection or relapse	10	11
Late latent, not previously treated	15	17
Late latent, reinfection or relapse	37	42
Congenital syphilis	1	1
Tertiary syphilis	9	10

Since "outside" personnel had been invited into the county for this survey, an estimate of survey expenses was computed. Total expense for the survey team borne by the State Board of Health was \$892.00, and for the Cumberland County Health Department, \$55.00. The cost per blood test was 40 cents and per positive serology test, \$3.73.

This survey, then, has been inexpensive in view of the high percentage of reactors found. Furthermore, as a result of the survey, familial contacts of the reactors will be found and brought to the clinic and more cases will be diagnosed and treated. The differences in percentages of positives and doubtfuls between the two surveys is probably explained by the fact that surveys of large industrial plants cannot be as selective as those of smaller plants. Differences are significant only in Negro females.

Table 1. Positive and doubtful reactors in diversified survey

Race and sex	Number examined	Reactors	
		Number	Percent
Negro:			
Male	724	167	23.1
Female	128	54	42.2
Total	852	221	26.0
White:			
Male	488	12	2.5
Female	143	11	7.7
Total	631	23	3.7
Male:			
Negro	724	167	23.1
White	488	12	2.5
Total	1,212	179	14.8
Female:			
Negro	128	54	42.2
White	143	11	7.7
Total	271	65	24.0
Grand total	1,483	244	16.5

Table 2. Positive and doubtful reactors in 11-day industrial survey

Race and sex	Number examined	Reactors	
		Number	Percent
Negro:			
Male	767	175	22.8
Female	193	48	24.9
Total	960	223	23.2
White:			
Male	915	24	2.6
Female	317	7	2.2
Total	1,232	31	2.5
Male:			
Negro	767	175	22.8
White	915	24	2.6
Total	1,682	199	11.8
Female:			
Negro	193	48	24.9
White	317	7	2.2
Total	510	55	10.8
Grand total	2,192	254	11.6

Health Certification

From July 1, 1951, to June 30, 1952, data on health certificate examinations were compiled in an effort to determine the value of screening for syphilis the group required to have health certificates.

The Cumberland County Health Department's code on health certification follows closely the State rules and regulations in requiring that employees of restaurants, cafes, grills, taverns, hotels, tourist camps, trailer camps, abattoirs, meat markets, frozen-food lockers, poultry establishments, and food-processing plants be examined for infectious diseases before they are employed. The city ordinance also requires taxi drivers to be examined. State laws include examination of teachers, premarital applicants, prenatal-care patients, barbers, beauticians, cosmetologists, and welfare applicants (for training schools and boarding homes, and for placement). Certain colleges and institutions require health examinations for entrance; and domestics in private employ are required by State law to obtain a "health card."

The enforcement of the statutory laws regarding health certification is left to the health

department in all cases except the following: beverage plants and bakeries (department of agriculture); ice cream and dairy plants (both department of agriculture and health department); taxi drivers (police); teachers, barbers, and beauticians (State). Health cards must be renewed each year and may be obtained from either the health department or private physicians.

Although examination at the health department includes chest fluoroscopy and serologic test, many applicants request a blood test only from the health department and then visit their private physicians for completion of the examination.

A check on laboratory reports for the fiscal year revealed that over 5,250 residents of Cumberland County (96,000 population) requested a serologic examination at the health department for either health certification or compliance with the prenatal law; 5,190 examinees professed to have had a negative history for syphilis and were tabulated as a single group. Others who had previous records of venereal disease or who admitted previous infection were referred to the venereal disease clinic for their health cards. The laboratory data on the 5,190 health examinees who had not been reactors or syphilitics at any previous examination are shown in table 3, by race and reason for examination.

A percentage of 4.6 positives and doubtfuls for the group was considered somewhat high since nearly all the examinees professed to have had previous negative serologic tests (10 percent of the donors in the 11-day survey had had syphilis). Moreover, the group was 46 percent white and included many children, skilled workers, and professionals.

Analysis of the returned health certificate application forms, of which there were 3,703 for the fiscal year, including former venereal disease patients, disclosed a positive or doubtful reaction in 262, or a percentage of 7.1. One third of these 262 reactors were treated for active syphilis in various stages:

<i>Stage of syphilis:</i>	<i>Percent</i>
Late latent, not previously treated-----	27
Early latent, reinfection or relapse-----	42
Late latent, not previously treated-----	2
Late latent, inadequate treatment or reinfection-----	19
Tertiary-----	19

It is interesting to note that the largest single group of examinees (1,007) was the unemployed. This group was characterized by a high percentage of young females (86 percent) and of positive serologic tests (11 percent). In fact, there were more unemployed girls (870) who applied for health cards than there were girls who had jobs (751) in cafes, restaurants, taverns, or bars, and who worked as

Table 3. Laboratory data on serologic tests of health examinees, fiscal year 1952

Type of examination	White				Negro				Total			
	Number examined	Percent of group	Reactors		Number examined	Percent of group	Reactors		Number examined	Percent of group	Reactors	
			Number	Percent			Number	Percent			Number	Percent
Health cards (food handlers, domestics, etc.)-----	1,888	-----	23	1.2	1,860	-----	133	7.2	3,748	72.2	156	4.2
Prenatal-care examinees-----	83	-----	0	0	780	-----	75	9.6	863	16.6	75	8.7
Premarital examinees-----	260	-----	1	.4	75	-----	5	6.7	335	6.5	6	1.8
Other (beauticians, barbers, and welfare school, and teachers' certificates)-----	150	-----	0	0	94	-----	0	0	244	4.7	0	0
Total-----	2,381	45.9	24	1.0	2,809	54.1	213	7.6	5,190	-----	237	4.6
Total, exclusive of prenatal-care examinees-----	2,298	-----	-----	-----	2,029	-----	-----	-----	4,327	83.4	162	3.7

Table 4. Effect of marital instability

Marital Status	Nonreactors (percent)	Reactors (percent)
Single-----	21	13.3
Married-----	66	63.9
Separated, widowed, divorced, second marriage-----	13	22.8

maids, domestics, and cooks. Theoretically, a health card is held by the employer as long as his employee works for him, but an unemployed girl may keep her card until she is employed. The existence of a large military reservation in the county may explain, at least in part, the problem of the unemployed female group.

Health certification for this area, therefore, must be considered an effective method of screening for syphilis.

Efficacy of Screening Methods

In order to gain some estimate of the amount of syphilis in Cumberland County, the persons who applied for health cards might be taken as a representative sample since they include all classes, races, and age groups in the county. By adjusting this sample group to the entire county population by age, sex, race, and occupation, using the 1950 population figures, it was determined that the prevalence of syphilis in Cumberland County amounted to approximately 1,900 cases (reactors) of whom 1,440 were Negro and 460 were white.

Through venereal disease control activities of the health department and private physicians, approximately 1,230 reactors were brought to disposition during the past year. Of these, 738 (60 percent) were found by the three above survey methods—diversified and industrial surveys and health certification. Of the remainder, 295 (24 percent) were discovered through the central activities of the venereal disease division, excluding surveys, and 196 (approximately 16 percent) were diagnosed by private physicians. Thus, the 1,230 reactors represent 64.7 percent of the total estimated reactor problem in Cumberland County.

As most of the reactors in the survey had late latent and tertiary syphilis, it would seem that the three methods of screening served primarily

to reduce the tremendous backlog of previously untreated or inadequately treated syphilitics. And by screening 9,093 individuals from a population of 65,000 between the ages of 15 and 70 years, 738 reactors were discovered. In other words, screening 14 percent of the population by survey brought to light 39 percent of the estimated reactor problem of the county. This points to the efficacy of selecting certain population groups for screening techniques.

Venereal Disease, a Sociomedical Problem

Social data were obtained on persons tested in the 11-day industrial survey and analyzed in an effort to study the relationship of social instability and the acquisition of venereal disease.

It was determined that, by marital status, 21 percent of the total group (2,192 donors) were single; 66 percent were married for the first time; and 13 percent stated that they were separated, divorced, widowed, or married two or more times. The latter denotes a group with somewhat high marital instability. Whites and Negroes of both sexes showed equivalent percentages of marital difficulty.

These individuals were also questioned about history of previous venereal disease and civil court records such as felony. Ten percent stated that they had had venereal disease; 5 percent reported disfavor in court action; and 86 percent gave clear records for both difficulties. Here, a large difference appears between the races in that 19 percent of the Negroes previously had venereal disease and 8 percent reported a previous court record. These percentages for whites were 3 and 2 percent, respectively. Tables 4 and 5 illustrate the social significance of these factors on the acquisition of syphilis (reactor group).

These data suggest that marital instability is associated with multiple sexual contacts and

Table 5. Effect of promiscuity and antisocial behavior

Social data	Non-reactors (percent)	Reactors (percent)
Previous venereal disease-----	4.6	50.6
Previous court record-----	4.4	8.8
Neither difficulty-----	91.0	40.6

increased opportunities for acquiring venereal disease. Also, antisocial behavior and promiscuity (as shown by high percentages of previous venereal disease) are significant factors in the acquisition of venereal disease. The differences between whites and Negroes in antisocial behavior may account for the large differences seen in rates of syphilis between the races. This last correlation is significant statistically. A previous report from this area on venereal disease rates of prisoners also substantiates these data (11).

That this problem is not one of race per se is shown by arranging the various groups and plants tested in order of highest percentage of reactors. Unskilled worker groups contribute the most reactors and skilled laborers and professional workers, the least. College entrants (68 percent Negro) and teachers (83 percent Negro) were groups that demonstrated no positives. Furthermore, of 606 serologic tests taken of Negro freshmen at the Fayetteville State Teachers College in 1951, only 3 were positive, a percentage of 0.5.

Summary

1. Three screening techniques as employed by the Cumberland County Health Department are described. These screening measures may be adapted to most local health departments, as they aim at economy, long-range needs, and high prevalence groups of the community.

2. An 8-month period of selective screening of small industrial plants proved to be a diversified, yet highly profitable, screening method. About 17 percent of the donors were reactors.

3. Employing the State venereal disease survey team, large industrial plants were screened in an 11-day period and approximately 12 percent of the donors were reactors.

4. Health certification during the year screened 5,190 examinees who professed negative serologies prior to examination; about 5 percent were found to be reactors.

5. By screening a total of 9,093 individuals from a population of 65,000 (aged 15-70), 738 reactors were found. In other words, by careful screening of 14 percent of the population, 39 percent of the estimated total reactors in the county were found.

6. Disposition of the positive serologies found in the industrial surveys indicated a majority of late latent and tertiary cases of syphilis in the older age groups. A significant percentage of early latent syphilis was found, however.

7. Screening by health certification is an effective method of finding early cases of syphilis, as the examinees for the most part represent a high-incidence group prone to reinfection.

8. The effect of marital instability, promiscuity, and antisocial behavior on the acquisition of venereal disease is offered as a basis for selecting groups in the population for survey. Antisocial behavior, particularly, may help to explain the differences in rates between Negroes and whites.

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Chronic Disease Mortality In Influenza Epidemics

Deaths from specific nonrespiratory chronic diseases have contributed to the total excess mortality during epidemics of influenza and pneumonia since 1935, a period when mortality from these diseases declined rapidly. Public Health Monograph No. 10, "Excess Deaths From Chronic Disease During Influenza Epidemics," considers this situation and reviews excess mortality from causes other than influenza and pneumonia in epidemics during the period 1918-34.

This paper is the fourth in a series on epidemics of influenza and pneumonia. The first three, published in *Public Health Reports*, include "Mortality from influenza and pneumonia in 50 large cities in the United States, 1910-1929" (1930), "Excess mortality from causes other than influenza and pneumonia during influenza epidemics" (1932), and "Trends and epidemics of influenza and pneumonia, 1918-51" (1951).

Weekly data from large cities in the United States during the periods 1918-34 and 1935-51 for 35 and 56 cities, respectively, are the basis for the study reported in Monograph No. 10. Weekly excess death rates from influenza and from other causes during the entire period 1918-51; total excess deaths during whole epidemics; concurrent peaks for deaths from influenza and pneumonia and from nonrespiratory causes during epidemics; total amount and percentage of excess mortality from influenza and pneumonia, and from nonrespiratory causes; distribution of mortality in four geographic regions; and diseases that account for excess deaths credited to causes other than influenza and pneumonia are discussed.



Public Health MONOGRAPH 10

This summary covers the principal findings presented in Public Health Monograph No. 10, published concurrently with this issue of *Public Health Reports*. The authors are members of the staff of the Division of Public Health Methods, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

. . .

Collins, Selwyn D., and Lehmann, Josephine: Excess deaths from chronic disease during influenza epidemics. Public Health Monograph No. 10 (Public Health Service Publication No. 213). U. S. Government Printing Office, Washington, D. C., 1953. Price 20 cents.

The State of the Nation's

Reports from the 51st annual conference of the Surgeon General of the United States Public Health Service and the Chief of the Children's Bureau with the State and Territorial health officers, mental health authorities, and hospital survey and construction authorities.

Report on Programs and Problems, 1953

1 Excerpts from a statement
by LEONARD A. SCHEELE, M.D.
Surgeon General of the
Public Health Service

Our country is still in a period of international emergency and national mobilization. The development of strong defense against the spread of aggression necessitates continued sacrifices by every American.

As public health workers, we have had an important share, from the beginning, in the program for economic and technical assistance to underdeveloped areas that need help to become strong allies. In sharing our knowl-

edge and skills, real progress has been made in the control of disease and the promotion of health.

Many State and local health agencies have joined with the Public Health Service in staffing these overseas health programs. Despite the general shortage of public health personnel, and although we have not been able to provide all the personnel our own Government and the struggling health agencies of underdeveloped countries have asked for, we have made a very good showing. These programs are so vital to the survival of a free world that the Public Health Service intends to tighten its belt even more so as to help meet their minimum staff requirements. We will continue to call on health agencies for help. (See report by Dr. Hyde, page 188, this issue.)

Health Material Requirements

During the past year, the Public Health Service has developed a smoothly running

organization to handle allocation of critical metals for construction of hospitals and health facilities. We are now concerned with the specialized technical staff work that must be done if civilian health supplies are to be available in the event of full mobilization.

This means that experienced and technically competent personnel must be available to work with industry in projecting potential demands and productive capacity 4 or 5 years ahead. The Defense Production Administration has delegated this responsibility to the Public Health Service. With the active cooperation of the health and medical supply and equipment industries, and the military forces, our Division of Civilian Health Requirements has made good progress in developing the basic data.

We expect in the immediate future to begin making similar estimates of facility requirements that would come with full mobilization. It will be important for State hospital survey and construction agencies to participate. We shall need to know what it takes to keep the existing hospital and health plant going; and what will be needed 4 or 5 years ahead for renovation and repair of buildings, replacement of equipment, maintenance of supplies, and so on.

Of special concern are items already in short supply, as well as those that would become critical under full mobilization. For example, already completed is a study of penicillin requirements, and our proposals for increased production have been approved by the Defense Production Administration. Recommendations soon will be completed on such items as surgical bandages, sutures, dental supplies and equipment, hypodermic needles and syringes, X-ray film and machines.

With these and to-be-developed data, the Public Health Service intends to keep abreast of the production situation so that civilian needs may be safeguarded in the face of increased demands and heightened competition for essential supplies and equipment.

Environmental Health

There are many encouraging signs of the emergence of practical solutions to some of the

“ONCE MORE the conference of the Surgeon General of the United States Public Health Service with the State and Territorial Health Officers—established by Congress as a statutory function 50 years ago—has assembled. In recent years, the effectiveness of this annual exchange of views has been strengthened by the companion conference of the Chief of the Children's Bureau and by concurrent conferences with the State hospital and mental health authorities. These actions testify to the common interests of health administrators from all parts of the country and to their desire to work together as a united force for the protection and promotion of the Nation's health.”

Thus the Surgeon General opened the 51st conference of State and Territorial health authorities held in Washington from December 8 to 11, 1952.

One of the important purposes of these meetings is to bring the health authorities up to date on important health developments and prospects on the national scene. Several reports which have more than transient interest are presented in these pages in abbreviated form. Other material stemming from these discussions will appear in later issues of *Public Health Reports*. Included here are excerpted reports from—

1. Dr. Scheele:	Page
Programs and Problems-----	174
2. Mr. Thurston:	
Federal-State Relations-----	181
3. Dr. Eliot:	
Child Health and Welfare----	183
4. Dr. Hyde:	
International Health Staffing--	188

critical problems created by new environmental factors in our rapidly changing society, at the same time that substantial progress is being made in long-established sanitation activities.

Radioactive Hazards

Steady progress has been made in the public health control of hazards incident to the use of radioactive materials and radiation-producing machines. Several State health departments already are operating radiological health programs—in recent months, for example, pilot programs have been initiated by the New Jersey and the California health departments. Progress also has been made on the Colorado Plateau in controlling radiation hazards inherent in the mining and milling of uranium.

Interstate Milk Shipping

The program for the certification of interstate milk shippers—recommended by the State and Territorial health officers for the past 8 years—has reached a point where additional support for the Public Health Service's share in these joint activities is essential. Despite lack of adequate funds, the Service has conducted during the past year a highly successful demonstration project. It has been shown that effective certification of interstate milk shippers can be achieved with the active participation of State and local health departments, agricultural agencies, and the dairy industry. If this modern method for the marketing of safe milk is to be extended beyond the limited area covered by our demonstration, all of the States, as well as the Public Health Service, will have to increase their activity.

Poultry Sanitation Code

The development of a poultry sanitation ordinance and code is going forward satisfactorily. This project is being conducted with full participation by the poultry industry and by law enforcement agencies.

Raw Garbage Feeding of Swine

The Executive Committee of the Association of State and Territorial Health Officers has been considering the need for appropriate legislation and supporting control measures in connection with the practice of feeding raw garbage to swine. The Public Health Service has been cooperating closely with the U. S. Department of Agriculture, and we believe that joint planning and action in this field will bring about better control of many swine diseases, including trichinosis and others of public health importance.

Up to now, our mutual efforts in this field have made headway slowly, because of lack of clear epidemiological data demonstrating the importance of trichinosis as a public health problem. Last summer's rapid spread, from coast to coast, of vesicular exanthema in swine, traced to the feeding of raw garbage, illustrates the hazards of the practice and its role in the

transmission of disease both to man and to domestic animals. This vesicular exanthema outbreak has stimulated reconsideration and brought forth new support from all quarters. Now is the time for State health departments to renew their cooperative efforts with their State agricultural agencies in legislation and control. The Public Health Service is tightening up its interstate action in this field, and we are prepared to provide States with technical and consultative service for their intrastate operations.

"Fringe Area" Housing

There is still a large residuum of substandard housing which presents basic sanitation problems—chiefly in urban and suburban areas, and not limited to "rural slums." "Fringe areas" still are growing faster than are our efforts to forestall serious health problems. Mobilization has brought with it a variety of housing sanitation problems. More than this, the morbidity and mortality rates from home accidents, the relation of housing conditions to cardiovascular disease, to arthritis and rheumatism, to the aging, and to many other conditions that stand among the Nation's unsolved health problems point day after day to the health agency's responsibility for action in the hygiene of housing.

Accidents in the Home

In home accident prevention, the Public Health Service and participating States have made some progress in developing the basic data essential for planning in this field. In fact, the time has come to pull together the recently acquired knowledge and experience and to evaluate what we have learned. Such an effort is planned for January when representatives of State, county, and municipal health agencies, voluntary organizations, and Federal agencies meet at Ann Arbor for a conference on home accident prevention.

Our Chemical Environment

The report of the House Select Committee to Investigate the Use of Chemicals in Foods and

Cosmetics focuses attention on the growing importance of the chemical environment as it affects human health. Much remains to be learned about the potential hazards, as well as the potential benefits, that may be inherent in the introduction and use of many new chemical compounds. With respect to our knowledge of the health effects of the chemical environment, we are just about at the same level of understanding as public health pioneers were three-quarters of a century ago in their knowledge of bacterial causes of disease. Our first steps, therefore, must be thorough research programs aimed at finding answers to fundamental questions.

Fluoridation Programs

In the advancement of dental public health, the fluoridation of public water supplies needs to be skillfully interpreted to the people of our communities. Although more than 500 towns are now benefiting from fluoridation, progress in applying this preventive measure has been impeded in some communities by misinformation. There have been some court actions, referendums, and opposition by groups and individuals.

Such situations are not uncommon in the history of public health progress. The early efforts to install chlorination of water supplies met with opposition, sometimes with unfounded fears of "poisoning." Again, we are called upon to exercise a high degree of public health statesmanship. The skeptics must be convinced that our epidemiological and laboratory studies are valid and that the benefits of fluoridation are not to be discarded lightly in the face of uninformed opposition.

Communicable Disease Control

New disease entities are being identified; new agents for prevention and control of well-known infections are being tested; and the problems of identifying the etiologic agents in unusual outbreaks are increasing—in short, future progress in the control of communicable disease depends upon the efficiency of our epidemiological and research techniques. In disasters or enemy attack, success in protecting

large populations from rapid spread of disease depends upon a well-organized, highly efficient, nation-wide epidemiological service.

During the past few years, the Public Health Service has been emphasizing the epidemiological approach in its communicable disease control and microbiological research undertakings. The sectional research program in microbiology set up in the National Microbiological Institute and the epidemic intelligence service set up in the Communicable Disease Center are the two major contributions of the Public Health Service to the attainment of such an organization. The institute and the center are, of course, developing their programs together as a team.

Emergency Reserves

The Public Health Service has made repeated attempts to build up a more extensive and vital inactive Reserve Corps, particularly for active duty in the event of full mobilization or disaster and to provide officers for assignment to the States for duty in defense-impacted areas. We have been handicapped by lack of funds.

We are, however, about to launch an experimental expansion of the inactive Reserve Corps in the engineer component. The idea is to have available a reserve of engineers who could be called to duty in the vicinity of their usual place of employment. Recruitment will be largely from sources other than State and local health departments—industries, public utility companies, universities, and units of governments having engineering personnel.

We plan to use our present engineering staff as recruiting agents and to keep inactive reservists informed on developments in environmental and general public health fields. Engineer reservists are expected also to have opportunities for active duty—from a few weeks as special consultants, to a year or two on special missions. Later we hope to conduct special training along the lines employed by military reserve organizations. This demonstration effort should provide experience that will be of value in the eventual development of an expanded inactive Reserve in components other than engineering.

Sectional Research Program

The aim of the sectional research program is to encourage laboratory and epidemiological research on infectious agents through the operation of a nation-wide network of regional and coordinating laboratories especially skilled in microbiological investigations.

At present, 98 laboratories, organized in 11 sectional groups, are participating. More than 10 percent are in State and local health departments, and representatives of several State laboratories are on the advisory committee helping us to develop this program. The Public Health Service has awarded research grants to those laboratories requiring aid in order to participate, and next year we hope to increase the amount available for these grants.

Epidemic Intelligence

The companion epidemic intelligence service has completed its first full year of service. We have been encouraged by the results and by the cooperation which has been extended by the State and local health departments, the schools of public health and medicine, and others who have teamed up with us. A second group of epidemiologists have completed their initial training at the Communicable Disease Center and are now in the field, bringing the number of medical officers in the intelligence service up to 32. By expanding this corps, and by stepping up various types of laboratory and field research, the Public Health Service is better prepared to discover and combat disease outbreaks, whatever their origin and wherever and whenever they occur. We stand ready to answer the call for epidemic aid from any quarter of the Nation.

Disease Reporting

Efficient morbidity and mortality reporting is a fundamental requirement in the investigation and control of communicable disease. The increasing strength of State activities in vital statistics and morbidity reporting is evidence of progress in this field.

Plans are going forward for an expansion of State and national reporting of animal diseases.

Although collection of data on animal diseases is a function of the United States Department of Agriculture, the Public Health Service has offered consultative assistance in the planning stages because of its many years of experience in the reporting of human diseases. I hope that the State health departments will offer similar assistance to their State agricultural agencies.

Poliomyelitis Prevention

Reports by several investigators within the past few months indicate that we may be on the threshold of development of one or more useful immunization agents for poliomyelitis (see *Public Health Reports* for January 1953, pp. 105-107). Much research remains to be done, but the immediate potentialities of gamma globulin pose major practical problems for Federal, State, and local health agencies and the medical profession. Close and active cooperation in the development of policies and procedures relating to blood collection, serum processing, and allocation are required of all hands.

Venereal Disease Control

By the middle of 1953, venereal disease control programs will have attained almost complete conversion to out-patient treatment of syphilis. This is indeed a triumph and one in which all of us share. It is the result of research, pharmaceutical production, and public health and private medical practice. Now every private physician can be an efficient venereal disease control officer, giving ambulatory treatment to patients in his office, while State and local health departments maintain the important supporting services of case finding, contact tracing, referral, treatment of many patients unable to pay for private care, and education.

State health departments are establishing about 70 prevention and control centers in strategically located urban clinics. They aim to provide the best in venereal disease diagnosis, treatment, epidemiological services, and education. From them will radiate services to physicians, local health centers, hospitals,

and social agencies in the area. There are here, also, opportunities for professional training in cooperation with universities and medical schools.

Chronic Disease Control

In tuberculosis, cancer, heart disease, diabetes, arthritis, and other chronic diseases we might well aim for levels of control that involve every practicing physician giving ambulatory treatment, either preventive or curative, in his office. Thus as a key element in its chronic disease effort, the Public Health Service continues to support an unremitting search for case-finding techniques that may be applied on a wide scale and for therapies that may ultimately be placed in the hands of the general practitioner as well as the specialist.

Certainly, facing up to the problems of chronic disease and an aging population, public health agencies need to encourage and develop many new types of partnership. There is strong support for chronic disease control and for health services to the aging. Yet State and local health services in most of these fields are scanty and scattered.

While new techniques for chronic disease control and hygiene of the aging remain in a twilight zone between experiment and widespread use, it may be that a "bridge" type of community institution with research, educational, and limited service functions is needed to speed the sound application of scientific advances. (See description of this type of institution in *Public Health Reports* for January 1953, pp. 8-9.)

Rheumatic Fever Prevention

All interested in health have long looked forward to the day when a sound preventive program against rheumatic fever could be proposed and endorsed. Recently, the American Heart Association and its affiliated Council on Rheumatic Fever and Congenital Heart Disease formed a committee on prevention of rheumatic fever. This group proposes, essentially, two main lines of action: (1) early and adequate treatment with penicillin of all cases of streptococcal infections; and (2) long-

term prophylactic use of sulfadiazine or oral penicillin in rheumatic patients. (See *Public Health Reports*, January 1953, pp. 12-15, for the full text of the statement.)

These recommendations of the leading specialists in this field represent a milestone on the road to control of rheumatic fever and its crippling companion, rheumatic heart disease. Implementation of the community programs which makes such control possible should be given high priority.

Rehabilitation

At the 1950 meetings of this conference it was recommended that the Public Health Service and the State health agencies undertake studies of the public health aspects of rehabilitation. We are now preparing the final report of a Public Health Service committee and task force on rehabilitation which was formed last year with the cooperation of the Office of Vocational Rehabilitation.

Community action for the improvement of rehabilitation facilities and services is widespread. Spurred by Federal aid for the permanently and totally disabled, many communities are planning and developing service programs with a minimum of health department participation. Unless State health officials move quickly and think through their responsibilities in this field, they stand to lose opportunities for significant leadership in improving health services generally and particularly in the fields of chronic disease and impairment where we already have operating programs.

Hospital Licensure

State health and hospital agencies increasingly are involved in the licensure of hospitals and related institutions. At their request, the Public Health Service has undertaken a compilation of existing regulations for institutional licensure. Guide materials for the development of licensing procedures and techniques are being prepared.

Licensure as a phase of hospital and related institutional care is destined to come into greater prominence as programs for the aging,

for convalescent care, and for rehabilitation expand. The subject requires a great deal more study, but such study requires more funds than the Public Health Service yet has had to devote to it.

Manpower Shortages

The shortage of professional and technical personnel which has engaged our attention for two decades continues to be a serious problem. Trained workers, never available in numbers adequate to meet the needs of organized services and institutions, are in steadily increasing demand from a number of sources. We must, therefore, make strenuous efforts toward more effective utilization of our present supplies of professional and auxiliary health personnel. It is highly probable, for example, that a number of duties now performed by physicians could be delegated to nonmedical personnel.

Critical evaluation of all activities, constant and intensive recruitment, in-service training, careful consideration of salary levels, opportunities for advancement, and satisfying work experiences—taken together—constitute main weapons against the current shortage. Essentially, this means that we must try to get well-qualified workers into public health, or workers with the potentiality for high qualifications, and we must make our field a career service for them—one which they need not and will not leave for another.

In nursing—a particularly difficult area—several State health agencies during the past year have been active in the conduct of nursing surveys. Some hospital divisions in State health departments also have taken the initiative in stimulating hospitals to evaluate the utilization of nursing personnel. The coming year should see increased activity in both these fields.

Re-examining Local Services

We in the Public Health Service believe that the time has come to re-examine carefully the entire concept of, and structure for, the delivery of community health services. The present pattern has served its purpose well. However, new forces have emerged in the total social

fabric. We are confronted with many new problems. Marked changes have occurred in the physical environment. The general standard of living has improved markedly. There are better means of communication and transportation. New scientific bases are available for prevention, diagnosis, and treatment of illness. There is a wider public understanding of personal and community health problems.

Are we taking advantage of these many new technological, social, and economic forces to make available the best possible health services at the lowest per capita cost? Are we organizing and administering programs that merely maintain the status quo, or are we getting down to the "grass roots" and finding out what precisely are the health needs and the best means of meeting them? Are we experimenting with new techniques?

To illustrate: In approaching a study of the amount and kinds of nursing service required to meet the minimum needs of local health departments, the Public Health Service has run head on into the basic fact that to consider the needs of a single type of service is not enough. The fact is, we have too long fractionated our approach. It is not enough merely to extend the study to cover other types of public health personnel. We must go much deeper.

Today's public health problems require a wide range of professional skills, facilities, and services. We have become increasingly aware that the newer programs do not always fit into the traditional structure. Many local health organizations as now constituted cannot cope with the problems. Local health organization is indispensable, and it must be strengthened. We must learn new ways of organization as well as new operating techniques.

Any new approach to local health services must be carefully planned after well-conducted studies. Such studies must be so designed as to yield results applicable to the whole field of public health, not merely to the solution of discrete problems. They must be of sufficient scope and longitude to insure valid conclusions. They must be focused more upon the human community than upon the professions which serve the community. They must draw upon the social sciences for their design, methodologies, and conduct.

The need for such appraisal of current practices and for the development of more effective and economical methods for different types of communities is of vital concern to all health workers. The Public Health Service hopes to begin the difficult first step of such studies—the planning—in the near future. But we cannot, and we will not, promise any hasty “appraisal” or quick results. But we shall do our best to add some useful knowledge to the science and art of public health.

Report on Federal-State Relations, 1952

2 Excerpts from a statement
by JOHN W. THURSTON
Deputy Administrator of the
Federal Security Agency

This meeting is significant because it is indicative of growth in health programs and responsibilities. It is also significant because it demonstrates maturity in Federal-State relations—serious, cooperative consideration of nation-wide health problems.

Back of the growth lies a long history of cooperation, the development of a system for recognizing, meeting, and solving health problems. We have created a structure that is enduring and that has met the test of time. The machinery for action-in-partnership is here and it works. It has become a part of our social heritage, extending beyond individuals and beyond shifts in political alignments. The only real danger we face is to fall victims of the twin evils of arrogance and complacency—to lose that sense of hopefulness and vision and hard work that brought us where we are today.

Results of Partnership

The results of the partnership have been substantial. Even as we reflect on the achieve-

ments of the past, however, we are wrestling with the problems of the present, in part created or intensified by earlier victories. The changing environment, the general aging and mobility of our population, the swift pace of industrial expansion bring us face to face with new problems. Health problems today are much more subtle and complicated than they were in the past.

The greater the awareness of the new factors, the more effective will health services be. Health workers must ally themselves with other social forces in the local and national community. The partnership must not only grow stronger between the various levels of government—local, State, and Federal—but must also branch out laterally. Adequate health services in the future call for genuine integration with related social programs, such as welfare and rehabilitation and education, and for close rapport with other community services that affect health, such as housing and community planning.

The Federal-State partnership is based on respect and trust, on the recognition of individual rights and mutual responsibilities. The flow of power is a natural one, from the individual citizen to his local community and then to his larger community, the State and the Nation. The interrelationship between the citizen and his government, and within the various levels of government, is delicate and subtle, yet strong, like a fine fiber.

An American Invention

The structure that binds us together is, in fact, unique in man's governmental efforts. It is an American invention, rooted in our social fabric and peculiarly suited to our geographic needs. It has developed out of a combination of circumstances—our pioneering traditions, our strong community bonds, our patterns of emerging social obligations. At its base is a federated system of government—a system of local, State, and Federal authorities—with each member of the partnership having its own set of duties, powers, and obligations.

The American federated system is also unique in its sources of strength and its possibilities for action. It preserves and extends

local independence and at the same time permits national concentration on national problems. Our citizens have different loyalties without necessarily having conflicting loyalties. We meet national needs best when local resources are strongest.

It is true that problems may not always be the same. The needs of some States may differ somewhat from the needs of other States, and local problems may not always be comparable to those of the State. But there is a core of problems that require joint undertaking, that confront all the people of the United States. And these problems demand the united efforts of our Federal-State-local system.

The result of the system then has been a fusion of effort which helps us to pull together our resources instead of scattering them or instead of quarreling over them. It is this kind of teamwork that has enabled us to undertake cooperative endeavors, to share ideas, resources, and facilities for a common national goal.

Unity and Responsibility

This is not to imply that all our endeavors have been marked by complete harmony. Nor would we want to pay the costs of such a harmony, the costs of smugness and stagnation. We have had differences, but they have been honest differences. But from these differences, from the hammering out of compromises, has come greater understanding and a higher kind of unity.

When we come to the differentiation of responsibilities, we find that certain broad categories of responsibility fall, quite typically and quite naturally, to the Federal partner, just as others fall to the States and the communities. For example, it is an accepted obligation of the Federal partner to conduct research and experimentation in new health techniques; to develop and set nation-wide standards; to collect national statistics of various kinds; and to meet problems which are interstate, international, or so new or so fluid that no State or local agency could possibly undertake them.

Financial aid is, of course, an important type of assistance offered by central to local governments. But it is by no means the only, or even

the most important, kind of aid. I think the grant-in-aid principle is firmly established in this country; it is one of the buttresses of our federated system of government. It is to be expected, however, that at any particular time one member of the partnership may be stronger in resources than another, and that there will need to be a continual balancing of forces in the interests of greatest economy and productiveness.

More important than the financial aid is the necessity for all groups to do their share in a unified, constructive way. The Federal-State health system is not a matter of giving but a process of sharing.

Trail Blazing by States

Sometimes it is charged that the Federal Government dominates the States. I know something about the Federal regulations governing grants for health purposes. And I see nothing in the Federal-State system that prevents any State from seizing the initiative and blazing the trail in new health programs. I do not think the States have been stifled because they have been the recipients of Federal grants. I do not know of many bold experiments or new programs that have been vetoed in Washington.

Certainly there have been experiments, new programs, new techniques. There will be more. There must be more if there is to be real progress. The flexibility of the Federal-State structure, its adaptability for many kinds of uses, leaves room for a wide variety of new programs, for administrative and technical pioneering.

This very meeting is evidence not of Federal coercion, but of healthy give-and-take discussion and of general agreement on goals to be reached and methods to be followed. Here we find a core of dedication, of good will, of social conscience, and professional competence that will enable this Nation to attain new levels of health.

I think we can all take pride in the health structure we have built, in our strong chain of health defenses. It has carried us a long way in a relatively short span of years. Despite calumnies, despite set-backs, despite the fears of some, it will carry us much further. I am

confident that the people, as well as the health professions, will be satisfied with no less in the future.

Report on Child Health And Welfare

3

Excerpts from a statement
by **MARTHA M. ELIOT, M.D.**
Chief of the
Children's Bureau

The United States is becoming a nation of old people. While it is true our aged are increasing in number, as a nation we are maintaining our youth. We are actually growing younger faster than we are growing older.

During the past decade, while the population over 65 years of age increased 37 percent, the population under 5 grew 55 percent. These children now are increasing our elementary school population in great numbers. Soon the effect of this increase will be felt in the high schools.

This fact has many implications for health, welfare, and education programs for children and youth. It means that during the current decade, we will be facing new and ever greater responsibilities in providing services for them.

Today in the United States there are nearly 48 million children under 18 years of age. The characteristics of this child population are of significance to us.

In rural areas live 43 percent of our children. Almost one-half of all children belong to families with incomes of less than \$3,000 a year.

An impressive reduction has taken place in infant and maternal mortality for the country as a whole. There are, however, many counties, largely rural, which lag a decade or more behind the more metropolitan counties. The majority of the counties where higher infant mortality rates prevail are in the southeastern and southwestern parts of the country, where some of our most economically depressed families live, many of them migratory workers, Negroes,

Spanish-speaking people, Indians. These people are living under serious disadvantages. They need our continuing help.

The needs in such areas are basic in character—adequate nutrition, housing, sanitation, public health services, maternal and child health services. Equally important are the acceptance and utilization of these services by a population which often does not understand too well what they are.

The Premature Infant

The leading cause of infant mortality throughout the Nation is prematurity. At least 7 percent of all live-born infants are premature, and about 60 percent of deaths in the first month of life are associated with prematurity. The inclusion of birth weight on birth certificates by the States is now making it possible, through the matching of birth and death certificates, to increase greatly our information about prematurity.

For over a decade health departments have done considerable educational work in the area of prematurity, lending incubators, providing consultation to hospitals, giving nursing care in the home, and providing opportunities for nurses and physicians to obtain additional training in this field. These efforts have been accelerated and extended in the past 5 years.

Among the newer significant developments has been the increase in the number of State health departments which are working with hospitals and medical schools in developing centers for the care of premature infants—centers which serve as the focal point of community programs for premature infants. Such programs are demonstrating that mortality among prematures can be reduced appreciably. These good results are even being extended to infants weighing less than 2 pounds.

The birth of a premature infant constitutes a serious economic problem for almost every family when it happens. The average duration of hospitalization is 30 days and the average cost per infant is almost \$500, and, naturally, the smaller the premature, the higher the cost. Clearly such a cost added to the cost of maternity care is often calamitous to families with low incomes.

That 16 State health departments are assisting families in bearing the costs of medical and hospital care, at least in demonstration areas, is encouraging. The development of such programs, though still in their inception, is among the outstanding accomplishments of health departments in recent years.

The increased knowledge about prematurity gained from these programs, together with an appreciation of what the financial burden of premature birth means to families, is leading State health departments to give more consideration to the possibilities of reducing the incidence of prematurity.

This involves, in the first place, extending prenatal care facilities so that women can have good care during pregnancy. Women who have poor care or none are about three times as likely to have a premature baby as those who have good prenatal care. The major known causes of prematurity are complications of pregnancy, which are prone not only to cause premature labor, but also to decrease the chances of survival of infants born prematurely. For these reasons, several States which have been active in caring for premature infants are also directing their attention to maternity programs, increasing prenatal care services, and providing medical and hospital care for women with complications of pregnancy. Herein lies the greatest possibility of reducing the incidence of prematurity, of lowering the costs of care for premature infants, of reducing the number of blind infants with retrolental fibroplasia, and of lowering fetal and infant mortality.

School Health Services

Health services for children of school age constitute a considerable proportion of the maternal and child health programs of many States. Health and education departments are giving greater attention to the use of screening techniques for finding children in need of medical attention and to assisting these children in securing the services they need. If less time were spent on frequent examinations of children in the schools and more time on screening and follow-up, on medical consultation to the

school, and on the utilization and development of local resources for diagnosis and treatment, most school health programs would undoubtedly be more productive of good results.

The pamphlet "Better Health for School Age Children," prepared by a committee of staff members of the Children's Bureau, the Office of Education, and the Public Health Service, has been widely distributed. Through its clear and specific statements on the subject (summarized in the November 8 issue of the *Journal of the American Medical Association*), it makes a real contribution to the literature in the field.

The Rural Problem

Earlier I referred to the fact that children living in rural areas are at a disadvantage in some respects. Medical specialists are for the most part concentrated in urban areas. Children in rural counties, moreover, receive considerably less medical supervision than those in or near cities. But it is particularly with regard to specialized services, such as those for premature infants and crippled children, that rural children are at a disadvantage. With our greatest medical skills concentrated in the teaching medical centers, one of our major problems is to help children in rural areas have the benefit of such skills.

State maternal and child health and crippled children's programs have pioneered in bringing to rural areas specialized services for certain groups of children, such as premature infants and children with orthopedic and other handicaps. In recent years, in addition, several health departments have developed pediatric consultation clinics in rural areas which bring at regular intervals the services of a well-trained pediatrician associated with a teaching hospital to the area. Not only are significant services thereby provided children who are referred for consultation by physicians in private practice and by public schools and other community services, but the clinic also serves a teaching purpose in the consultative relationship between the pediatrician and local practitioner. Children in need of further diagnostic work or treatment which cannot be obtained locally are provided these services in an urban teaching hospital which in this respect takes

on a regional function. This relationship of the local pediatric or special clinic with the teaching hospital is a most important factor in raising the quality of care. Extending arrangements such as these would greatly improve the quality of care for children throughout the country.

Crippled Children

State agencies have continued to make gains in the past year in extending services for crippled children, a group for whom there is much support from the public. Parents' groups particularly have become much more active in recent years in supporting these services. Although some of these groups have tended to emphasize certain conditions, they are nevertheless a constructive force which can be of great assistance to all of us in program development.

States are experimenting, too, with new types of services. Since the beginning of the epilepsy demonstration program in Maryland in 1950, some seven or eight other States have also begun epilepsy programs. Other States are planning them. Through the active participation of organized public health services, the benefits of research in therapy can be brought to epileptic children all over the country.

Progress is also being made in the further development of the regional congenital heart disease program. California's program is now in operation serving the far West, Alaska, and Hawaii. The program centering in Illinois is under way and plans for Texas and Maryland have been approved. Programs such as these are representative of the dynamic nature of public health today and its readiness to experiment with new methods of providing service.

Interesting developments are also taking place in services for children who have cleft palate. This group of children has been included in virtually all of the State crippled children's programs since the passage of the Social Security Act, but recently, in a number of States, some of the traditional concepts of treatment are being questioned and modified. Again, the necessity of considering the child first as a growing individual and second as one with a defect in a particular part of his body is being emphasized.

Surgery for cleft palate is not the solution for all children. For those who do need surgery, careful consideration must be given to the age at which this will be done. Many children, without surgery, have satisfactory speech with the aid of a prosthesis. Too many children who have had several operations still do not have a closed cleft or satisfactory speech.

One of the most encouraging aspects of the newer concepts in this field is the recognition that the care of the child with a cleft palate is not the province of the surgeon alone. Some of the best work is being done in those centers where each child is carefully studied by a team—the plastic surgeon, pediatrician, orthodontist, prosthodontist, speech therapist, medical social worker, public health nurse, and others—which considers all the aspects of the situation and reaches agreement on what is the best procedure to be followed for this particular child. Such teamwork offers new opportunities for greatly improved services in a technically difficult area. Opportunities for training in this field are being offered through the University of Illinois Medical School and services for crippled children in Illinois.

Children of Migrants

A different problem, that of children of migratory agricultural workers, demands attention. Their number varies with the season of the year, but it ranges from 250,000 to 1,500,000. These children are, economically and socially, the most depressed group of children in the whole country. Few stay long enough in any one place to call it home. They grow up without having enough of anything. They lack food. They lack adequate shelter, clothing, medical care, and education. Sickness and mortality rates are high among them. These children contribute to the high infant mortality rates in the Southeast and the Southwest. The problem of the families to which these children belong is fundamentally an economic one. Its solution lies in some far-reaching social and industrial measures. Until these measures are undertaken, attention must be directed to the serious health problems of the children. Some States are already helping these families, but in many localities their needs are still unmet.

To be effective, not only must the several agencies involved within a State make a concerted effort; there must also be cooperative interstate efforts. Among the measures that need to be taken are: adequate housing; environmental sanitation; health and medical care services for infants, young children, and expectant mothers; health education that will reach the different cultural groups; and interstate cooperation.

One of the principal causes of death among infants and children of migratory workers is dysentery, a fly- and water-borne disease. Adequate sanitary engineering, fly control, and screening of houses will do much to reduce this mortality. Even as we help peoples in Europe, Asia, and Latin America to adopt sanitary measures, we must help people in some sections of our own country to do the same.

Bringing adequate health services to these families is not a simple matter. One of the basic problems in providing services for migrants is the lack of coverage by local health units. When we have the basic services in public health that we need in rural areas, at least some of the migrant's health problems will be solved, or the mechanism will be available for solving them. I would give the strengthening of the local health units a very high priority among our public health needs but even with basic coverage attained, the job of increasing services suddenly for large numbers of people for a short period of time is a difficult one.

Mobile units may have to be considered. Probably additional staff—physicians, nurses, medical social workers, nutritionists, health educators—will be needed to provide individual services and to make arrangements with social agencies for child welfare services. In view of the poor resources these families have, the provision of medical and hospital care must be included.

Provision of day-care centers would constitute another constructive health, as well as welfare, measure. Since both parents and older children in these families usually work, young children are commonly left pretty much on their own. In a few States, day care is being provided, but additional financial support is needed if any headway is to be made in the provision of this service.

State and local health and welfare departments which have the basic organization to do the job must take the responsibility for the administration of health and welfare services to meet the needs of migrants. Migrants should not be set off from the rest of the population but should be enabled to participate in all community services to the fullest extent possible.

Juvenile Delinquency

One of the most serious byproducts of the general insecurity brought about by periods of national and international unrest is the marked increase in juvenile delinquency. Adolescence is a period when youth is naturally in revolt against the adult world. In seeking their own place in the world and establishing their identity, adolescents tend to band together. They may easily fall into antisocial patterns of behavior with which we are familiar in this country. They may also be exploited as in totalitarian countries. It is our responsibility to understand the behavior of adolescents and to help direct it into constructive channels.

Because this problem is becoming increasingly serious, the Children's Bureau during the past year has been giving a majority part of its attention to it. We have established in the division of social services a newly organized juvenile delinquency branch. A special juvenile delinquency project is being financed through private contributions to the Child Welfare League of America. This special project is working closely with the Children's Bureau. We have had a series of conferences with many leaders in this field and with public and private agencies, one of the most recent being with the National Health Council. The Children's Bureau has published several factual pamphlets about juvenile delinquency, and the December 1952 issue of *The Child* is entirely devoted to this subject.

These are a few of the facts we have brought to public attention:

About 350,000 children were referred to the juvenile courts in this country in 1951. Most of these boys and girls are 15 to 17 years of age.

About 1,000,000 were picked up by the police for delinquent behavior.

The number of delinquent children seen in

juvenile courts has increased 19 percent between 1948 and 1951.

Some 50,000 to 100,000 children are detained each year in local jails, often with adult criminals.

As a result of the increased birth rate, it is expected that by 1960 there will be 45 percent more children between 10 and 17 years of age than there were in 1950. Even if the rate of delinquency does not increase, the number of children picked up by police may rise to 1,500,000 by 1960.

We can do much to prevent delinquency, and we can provide juvenile delinquents with the treatment they need, much better today than in the past.

The Mentally Retarded

Another important problem is becoming of increasing concern to public agencies, that of the mentally retarded. The parents of these children are increasing their efforts to secure help for them. In public programs, when both funds and personnel are short, priorities must be given to some activities. Unfortunately, the mentally retarded are not high on the priority list. Yet as we learn more about these children and their problems, we find that many with help need not be nonproductive nor a financial drain. Access to good diagnostic services is a first step in a constructive approach to the problem. Let us hope that in the near future, health, education, and welfare agencies can give consideration to how their resources can be utilized best in helping these children and their families.

Personnel Shortages

The need for personnel continues to be a major problem and probably will continue to be for some time. Progress, I believe, is being made in improving the teaching of preventive medicine and public health in medical schools so that more medical students will be graduating with some knowledge of the modern concepts and services of public health agencies and an increased respect for public health. Because of this shortage of personnel we continue to emphasize the need for increasing oppor-

tunities for training. The principal means of doing this is through the provision of adequate stipends for fellowships. There is need to give some long-term fellowships—2 or 3 years—to assure fuller training in the many aspects of child health that will be required by future leaders in our maternal and child health programs. This is essential if we are to maintain our gains of the last few years.

Evaluation of Services

Large sums of money are spent by Federal, State, and local governments to promote children's health and welfare. The needs of children and their parents for aid in these respects are great, and it is to the advantage of all that the physical and emotional health and social functioning of children and youth be the best possible. That evaluation of health and welfare programs and practices is needed is obvious.

To carry on evaluation studies is a huge and long-range task. The Children's Bureau plans to provide research consultation to those States requesting it in one or another of the following program areas in 1954:

1. Foster care of children who are homeless, neglected, or for some other reason need care outside their own homes.
2. Adoption services.
3. Delinquency control and services to delinquents.
4. Health supervision of children through child health conferences or school health programs.
5. Services to crippled children, especially those services that are not medical.

There is a limit to the amount of consultation services the staff can give. As a first step in undertaking such studies, a report on the methodology of research is being prepared.

The various subjects touched on here, though briefly, demonstrate the broad interest of the Children's Bureau in children and the close relationship between child health and child welfare. The physical, social, and emotional problems of children are inseparable. Only as all the professions involved work together in a genuine spirit of service can the interests of children be served in the way we all want them to be served—to the highest degree possible.

Report on International Staffing

4

Excerpts from a statement
by HENRY van ZILE HYDE, M.D.
Technical Cooperation
Administration

The resolution of the Association of State and Territorial Health Officers (see page 189) constitutes clear recognition of the fact that from now on the United States is inextricably involved in the health problems of the world. It further recognizes that this is a phase of public health which is not exclusively a Federal responsibility—not solely a responsibility of the Public Health Service, nor of the Department of State nor any other Federal agency. This statement gives clear recognition to the fact that American health leaders, at all levels, must from now on encompass a world responsibility while discharging their domestic responsibilities.

Your resolution is encouraging not only to the Federal agencies concerned with international health, but to the World Health Organization, the Pan American Sanitary Bureau, and, more particularly, to those countries that need your leadership and assistance in improving their health. It will serve as a beacon to them in searching the way out of the morass of ill health.

Mobilizing State Leadership

For some time we in the national agencies have been seeking ways whereby the full force of American public health leadership could be brought to bear upon the problems of health abroad. We are well aware that leadership in public health in this country resides to a very large degree in the State and local health departments. A practical question is: How can we avail ourselves of your leadership and the leadership under your influence in tackling international health problems?

The Public Health Service is taking a first step toward an answer. Taking into account that the international phase of public health is a long-term responsibility with workaday aspects, the service is transferring its Division of International Health to the Bureau of State Services. This move should integrate more closely and bring into proper balance within the Service the domestic and international phases of its total public health responsibility. It is hoped that this move will strengthen the intimacy of the relationship of the Service to the State health officers in discharging international responsibility. It will provide, likewise, opportunity for full utilization of the regional offices in international work.

Approaches and Principles

How can we mobilize full strength in this program? How can we bring it fully to bear on the international problem? We need to seek new ways and to seek these together. The problem has been discussed with a number of State health officers. In every case we have found enthusiasm and interest, with reservations only concerning ability to contribute as largely as the State would wish.

There are certain underlying principles governing the program that should be understood:

1. It is truly a joint endeavor with each country, not a unilateral effort.
2. The specific content of each country's program is determined jointly with the ministry of health in the country concerned. It is not laid out in Washington nor by the Americans in the field.
3. Program can be influenced most effectively in the field, by field visits, when the annual program is being developed. It would be brash to attempt to mold or veto programs at great distances, particularly when they are to be carried out in a foreign setting.
4. The United States is furnishing leadership, not the mass of workers. Quality, not quantity, is required—competent, experienced public health leaders to give direction to pro-

Whereas, the Association of State and Territorial Health Officers recognizes the importance of improving world health as a sound basis for insuring world peace, and

Whereas, the United States of America has achieved pre-eminence and leadership in the field of public health, largely due to the training and experience of all public health personnel in State and local health departments and the U. S. Public Health Service, and

Whereas, by cooperation in the extension of modern public health services to other countries in the world, as well as the interchange of views and experience through the assignment abroad of trained United States personnel there has de-

veloped a better mutual understanding of the problems concerned and distinct improvement in local and domestic health conditions: And, therefore, be it

RESOLVED, *That the Association of State and Territorial Health Officers, assembled in annual sessions at Washington, D. C., December 8-11, 1952, hereby pledges its continued interest and support to the international health programs now being carried out and strongly recommends that State and Territorial health officers encourage and, by active participation wherever possible, extend this great movement in international health, and thereby help to promote the spirit of good will and peace throughout the peoples of the world.*

gram development and to train and direct indigenous workers.

Personnel and Objectives

In the 18 countries in Latin America, where the program is most advanced, there are fewer than 100 American technicians directing programs involving over 6,000 native personnel. In the Near East, African, and Asian areas, there are now in the field of health and sanitation about 95 technicians under an authorized budget providing for 158 positions. Although some increase of the authorized budget might be forthcoming, it is not expected that the number of personnel required will skyrocket.

The object of the program is, of course, to build strong, permanent, self-supporting national and local health services. It is necessary first to create widespread public demand for such services—a demand sufficiently strong and clear to constitute effective political pressure. Such a demand can be generated through sufficiently widespread, successful demonstrations of effective health services. At the same time, it is necessary to train indigenous technicians, both professional and subprofessional, and to develop true public health leadership within

the country. The program is, thus, basically one of demonstrations and training. It is a program that requires competent, experienced leadership abroad working under the stimulation and broad guidance of the best at home.

A Pioneering Step

In seeking means for full participation in this program, an important pioneering step has recently been taken in the signing of a contract between the Commonwealth of Massachusetts and the Technical Cooperation Administration of the Department of State. This contract establishes the principle of cooperation and sets up a working method that is already providing action. The principles inherent in it are important.

The contract establishes a special relationship between the Department of Public Health of the Commonwealth of Massachusetts and the Technical Cooperation Administration, with particular reference to the Point IV health program in Pakistan. The contract, in its preamble, recognizes the fact that the personnel and facilities of the Department of Public Health of Massachusetts are particularly well suited for participation in the activities contemplated under the program for the improvement of public health and sanitation in a rela-

tively underdeveloped country. The Commonwealth on its side recognizes that its personnel under such an arrangement will gain invaluable training and experience in work abroad.

Article I defines the functions of the Department of Public Health of the Commonwealth as follows: (1) to make available the ability and services of the commissioner of public health as chief consultant to the Government of Pakistan and the Technical Cooperation Administration in the development of cooperative programs of public health in Pakistan; (2) make available the abilities and services of such specialized personnel of the Department of Public Health as the commissioner may consider advisable to serve as additional consultants; (3) be responsible, in cooperation with the appropriate officials of the Government of Pakistan or other participating countries and the directors of United States technical cooperation in such countries, for the planning of cooperative programs for the development of public health; (4) endeavor to provide, as expeditiously as is practical, technicians to perform services as the needs of the cooperative public health and sanitation programs in Pakistan or other participating countries require and as requested by the Technical Cooperation Administration; (5) assume responsibility for participating in the selection of candidates for Technical Cooperation Administration grants for training.

Certain funds are transferred to the Commonwealth of Massachusetts in order to enable it to carry out these functions.

TCA-Massachusetts Team

It is important to notice that this contract sets up a partnership between the Technical Cooperation Administration and the Commonwealth of Massachusetts' Department of Public

Health—a partnership dedicated to assisting a specific country through a cooperative program. The State will have a major voice in the form that such a program might take. It will give intellectual leadership, stimulation, and direction. Staffing will be only a part of the job. Under such a contract State personnel can be assigned to foreign duty without loss of rights within the State service. Such personnel can continue to grow under the leadership and direction and observation of the State health officer.

The contract is not so rigid as to exclude other methods of employment. Particularly, when it is advantageous to do so, the personnel may be commissioned in the Reserve Corps of the Public Health Service. Whether in the employ of the State or commissioned, personnel when on assignment to the foreign country will work as an integral part of the Point IV mission to the country, receiving technical stimulation, guidance, and leadership from the State health officer in close conjunction with the Technical Cooperation Administration and the Division of International Health of the Public Health Service.

A contract such as that which has been entered into with Massachusetts may be applicable in the case of other States which wish to participate in this program. In some States quite a different pattern might be required. It has been suggested that in certain States it might be desirable to establish a new, separate entity of government under the State health officer. In a number of States specific legislation may be required in order to provide for leave of absence or to encompass service abroad within the framework of State service. The matter needs to be explored on a State-by-State basis because of the variations in legislation and resources.



1950 Census Findings on Health Occupations

About 1,400,000 persons, or 2.5 percent of the total civilian labor force in the United States in April 1950, were employed in a group of 17 health occupations. These estimates are derived from preliminary summarizations of the 1950 Census of Population prepared for the Division of Public Health Methods, Public Health Service. Persons on active duty with the Army, Navy, and Air Force, as well as those unemployed, are not included.

The figures for 1950 as shown in the accompanying table are based on a preliminary summary and are subject to change. Figures for 1940 are from the 1940 Census of Population, adjusted where necessary to conform to the 1950 classification. Final 1950 figures and adjusted 1940 figures for the United States will be published by the Bureau of the Census in the spring of 1953 in the series P-C reports.

Since the census figures differ from those available from other usual sources, it seems important to urge caution in the use and interpretation of the 1950 census findings on health occupations. An attempt is made in the following notes to discuss some of the points to be considered in using the new data.

Physicians

Almost 192,000 persons in the civilian labor force in April 1950 were reported employed as physicians and surgeons in these census tabulations. The increase during the decade 1940-50 was 26,000, or 15.6 percent. During the same period the civilian population showed a net gain of 14.1 percent.

The estimated number of physicians, based upon reports from the American Medical Association, was 205,300 in the spring of 1950. This figure includes 9,900 retired, or not in practice, and 7,500 in the armed forces, leaving 187,900 in active civilian practice. When the 1948

AMA age distribution is applied to the 1950 total and adjustments are made for those retired and in military service, the active civilian physicians fall into the following groups in terms of age at last birthday: 24,200 under 30 years of age, 134,700 from 30 through 64, and 29,000 aged 65 or older as of April 1, 1950.

The census figures are about 8 percent higher than the AMA estimates for the combined age groups under 65 years. The census tabulation shows 26,700 physicians under 30 years of age, an excess of about 2,500 over the AMA. For the age group 30-64, the census enumerated 144,500, about 9,800 more than the AMA. At the younger age the census enumeration may have included some medical students taking clinical training and hence reported as physicians. Obviously, the census count must include, in addition to persons with medical degrees, many thousands in such occupations as chiropractic, dentistry, osteopathy, and veterinary medicine. On the other hand, physicians reporting that they spent all, or a major part of their time, in teaching or administrative work, for example, would not have been classified as physicians in the census.

At the upper end of the age scale the census enumeration is substantially less than the AMA figure. The census tabulation shows 20,800 employed physicians aged 65 or over, about 8,200 fewer than the AMA. Since the census enumerator asked specific questions about work during the week prior to enumeration, many of the older physicians may have reported inactivity at that time although they had not designated themselves as retired in reporting for the American Medical Association Directory.

Dentists

About 75,000 persons were employed as dentists in civilian practice in April 1950, accord-

ing to the 1950 Census of Population. This is an increase of 7.5 percent during the decade 1940-49. Projection on the basis of the preliminary age distribution of employed male dentists indicates that at the time of enumeration about 8,000 of the employed dentists were under 30 years of age, 59,400 were in the age group 30-64, and 7,600 were 65 years of age or older.

Studies published by the American Dental Association indicate that there were about 87,000 living dentists in the spring of 1950. Of this number about 1,600 were in the armed forces. While reliable information on retirement is not available, limited data obtained by the American Dental Association from a surveyed sample of dentists have been published. Application of their findings to the total dentist group suggests that the retired do not number more than a few thousand and that this group, together with those serving with the armed forces, cannot account for all of the difference between the two totals.

Inspection of age distribution data from the two sources indicates that the census count exceeds by a thousand or more the number of dentists under 30 years of age for whom data were

recorded in the ADA files. This excess may reflect the inclusion of some dental students in their clinical training years. For the age span 30-64 years, the count obtained by the Bureau of the Census was several thousand less than the number included in the ADA total even after liberal adjustment is made by subtracting from the ADA total retired dentists and those serving in the armed forces. It seems likely that this under-enumeration may in part explain the excess in physician enumeration discussed previously. While the census total for dentists 65 years of age and older is smaller than the ADA figure for this group, adjustment of the latter by subtracting retired dentists brings the figure into close agreement.

Nursing Occupations

In the field of nursing, four categories of personnel are reported by the Bureau of the Census. These are graduate professional nurses, students of professional nursing, attendants in hospitals and other institutions, and practical nurses, together totaling 810,920 employed in civilian practice in April 1950.

Employed persons in selected health occupations, by sex, for the United States: 1950 and 1940

Occupation	1950			1940		
	Total	Male	Female	Total	Male	Female
<i>Professional and technical workers</i>						
Chiropractors.....	12, 897	11, 061	1, 836	10, 629	8, 758	1, 871
Dentists.....	75, 176	73, 024	2, 152	69, 921	68, 874	1, 047
Dietitians and nutritionists.....	22, 329	1, 341	20, 988	(¹)	(¹)	(¹)
Nurses, professional.....	398, 194	9, 683	388, 511	352, 486	7, 509	344, 977
Nurses, student professional.....	76, 071	1, 646	74, 425			
Optometrists.....	15, 476	13, 758	1, 718	10, 237	9, 762	475
Osteopaths.....	5, 146	4, 366	780	6, 007	4, 905	1, 102
Pharmacists.....	88, 087	80, 854	7, 233	77, 779	74, 563	3, 216
Physicians and surgeons.....	191, 947	180, 233	11, 714	165, 989	158, 381	7, 608
Technicians, medical and dental.....	76, 174	33, 053	43, 121	(¹)	(¹)	(¹)
Therapists and healers ²	24, 443	12, 347	12, 096	17, 055	9, 545	7, 510
Veterinarians.....	13, 410	12, 547	863	10, 717	10, 638	79
<i>Other workers</i>						
Attendants, hospital and other institution.....	202, 168	83, 117	119, 051	93, 049	54, 307	38, 742
Attendants, physician's and dentist's office.....	40, 777	2, 028	38, 749	32, 309	1, 387	30, 922
Opticians, and lens grinders and polishers.....	19, 147	16, 643	2, 504	11, 098	10, 107	991
Midwives.....	1, 698	307	1, 391	91, 107	3, 909	87, 198
Practical nurses.....	134, 487	5, 731	128, 756			

¹ Data not available. ² Not elsewhere classified.

Source: U. S. Bureau of the Census. Figures for 1950 based on preliminary summarization and subject to revision.

Graduate and student professional nurses are reported separately for the first time, but the census figure for students is far short of the enrollments in the schools of nursing as of January 1, 1950. Census information on the age distribution of those included in the professional nurse count suggests that more than 20,000 individuals reported as professional nurses may actually be students. Adjustments, on this basis and in terms of probable enrollments at the time that the census was taken, give totals of 99,700 professional student nurses and 374,600 employed professional nurses. The combined total for these two categories shows an increase of 34.5 percent over the 1940 census count.

It should be borne in mind that the figure on professional nurses includes all employed graduate nurses whether or not they are currently registered. It seems likely that some nonprofessional nursing personnel also may be included, but the meager data now available from other sources suggest that this error is relatively inconsequential.

Other Health Occupations

The census enumerations of several occupations closely allied to medicine are considerably lower than estimates of active practitioners in 1950 available from the professional associations. Some comparative figures are given below:

	Census	Association
Chiropractors -----	12,807	20,512
Optometrists -----	15,476	19,724
Osteopaths -----	5,146	11,155
Veterinarians -----	13,410	15,305

The figures from the associations include persons in the armed forces and may include some who are retired, inactive, or devoting the major part of their time to other occupations. Adjustment for these factors still shows that the census counts are substantially lower than the estimates from other sources. Further investigation of the census figures will be possible when State tabulations showing detailed characteristics become available in the spring of 1953.

Mrs. Hobby New Federal Security Administrator



Oveta Culp Hobby of Houston, Tex., took office as Federal Security Administrator on January 21, 1953. Fourth Administrator since the Agency's creation in 1939, she will supervise the operations of the Public Health Service, the Social Security Administration (including the Children's Bureau), the Food and Drug Administration, the Office of Education, the Office of Vocational Rehabilitation, Howard University, St. Elizabeths Hospital, the American Printing House for the Blind, and the Columbia Institution for the Deaf.

At the time of her appointment Mrs. Hobby was editor and publisher of the Houston Post and executive director of Station KPRC-AM-FM-TV. Prior to World War II she served as parliamentarian, Texas House of Representatives, and was on the editorial and executive staffs of the Houston Post.

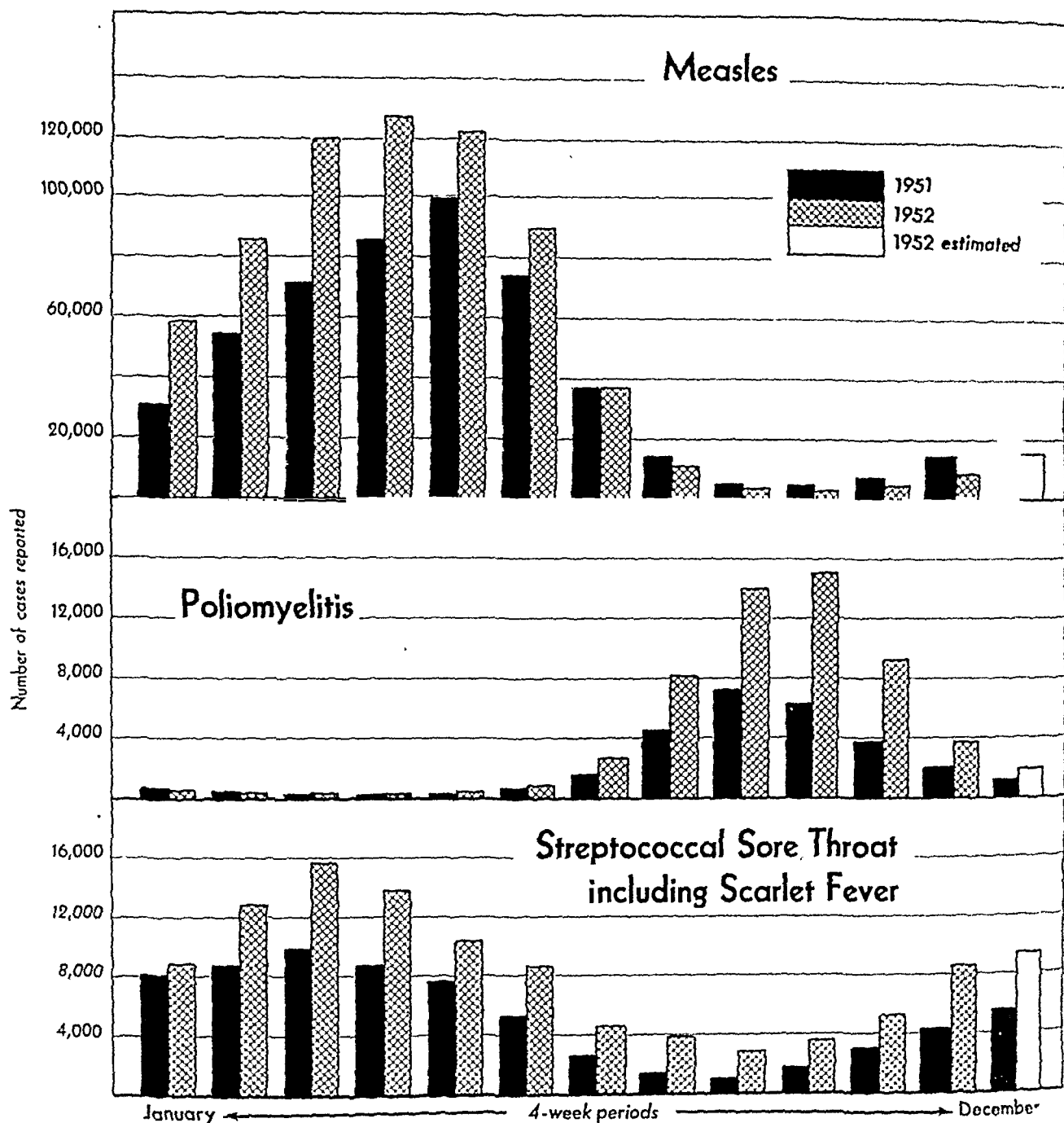
Mrs. Hobby came to Washington in 1941 as chief of the women's interest section of the War Department. When the Women's

Army Auxiliary Corps was created in 1942, she was appointed its director. She also served as director of the Women's Army Corps, with the rank of colonel, from 1943 to 1945.

The Administrator has been active in journalistic affairs, here and abroad, serving on the board of directors of the American Society of Newspaper Editors (1947-50), and as consultant-alternate to the Freedom of Information Conference at Geneva in 1948.

Mrs. Hobby has been a member of the board of directors of the National Conference of Christians and Jews. She has also been a member-at-large of the board of governors of the American National Red Cross. In 1948 she was a consultant to the Bipartisan Commission on Organization of the Executive Branch of the Government, and later became a member of the board of directors of the Citizens Committee for the Hoover Report.

National vice chairman of the 1949 American Cancer Society campaign and a member in 1950 of its national leadership committee and national advisory council, Mrs. Hobby also is a member of the board of directors of the Texas Medical Center.



Seasonal Occurrence of Communicable Diseases

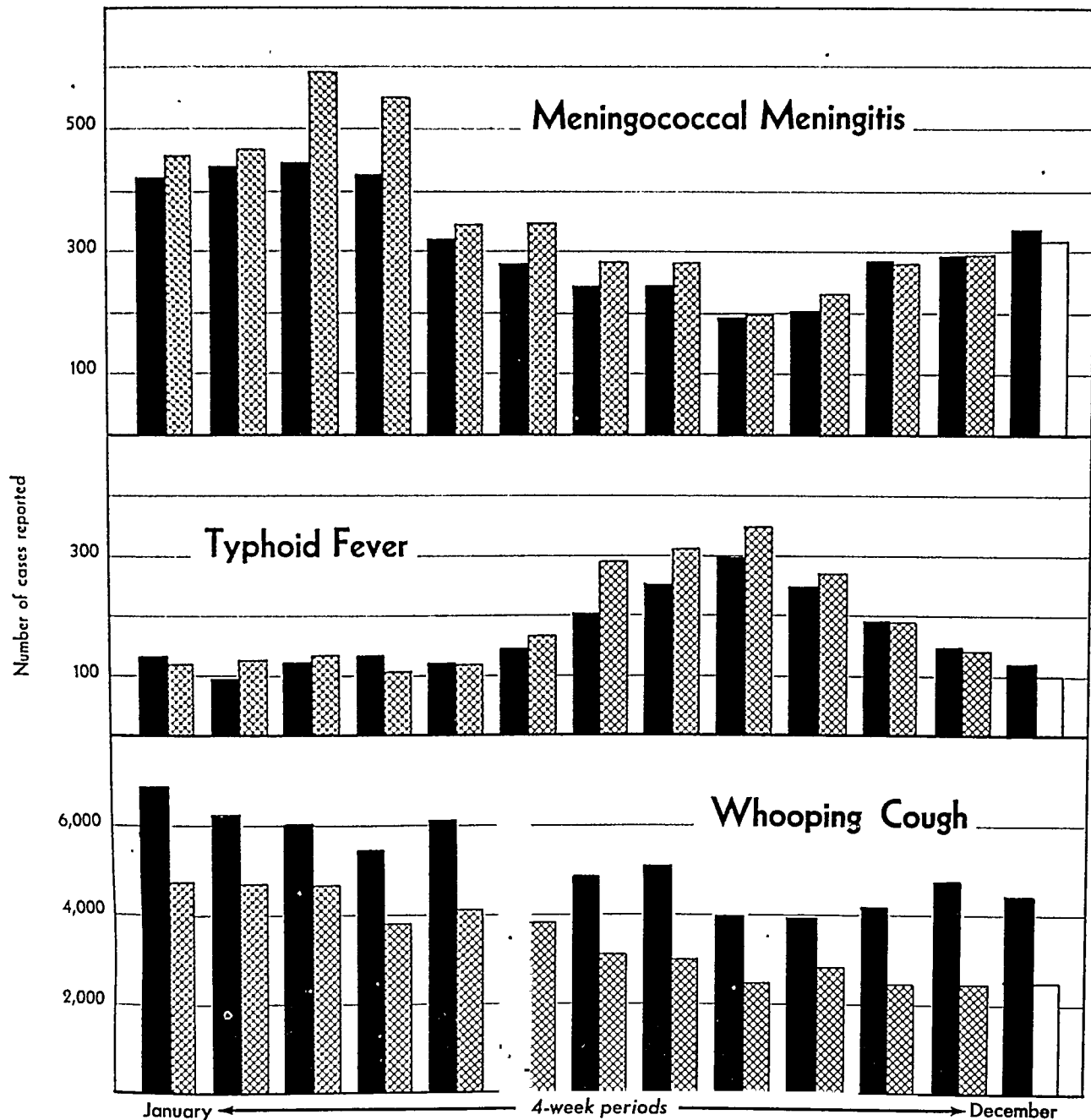
1951 and 1952 Summary

The relatively high incidence of measles and streptococcal sore throat including scarlet fever in the winter and spring months, as compared with summer and fall, is

striking. Meningococcal meningitis and whooping cough also occur more frequently in the winter and spring than in other seasons, but incidence of these dis-

eases is more evenly spread over the entire year than is measles or streptococcal sore throat.

The distribution of two "summer" diseases, typhoid fever and



poliomyelitis, is also different. Typhoid fever is spread throughout the year but has a summer peak; poliomyelitis is mainly concentrated in a few months—July, August, September, and October.

Several of the six diseases occurred in greater numbers in 1952 than in the previous year. This is particularly true for measles and

poliomyelitis. However, in the last half of 1952, incidence of measles was less than that for the same period of 1951. Streptococcal sore throat, including scarlet fever, was reported in larger numbers for each of the 4-week periods of 1952. Incidence of meningococcal meningitis was higher in the winter and spring months of

1952 than it was in 1951; in the summer months of 1952, more typhoid fever occurred than during the same period of the previous year.

This material was prepared by the National Office of Vital Statistics, Public Health Service.

Community-Wide Chest X-Ray Survey

Tuberculosis control rests primarily on the principle of preventing the spread of infection. Now that we have successfully controlled milk-borne infection, our remaining problem centers on finding every human source of infection, every person with active disease, as soon as possible. Supervision and care, the means of preventing further infection and of making the patient non-infectious, can thus be provided at the earliest possible moment.

Since a person with an unknown or hidden case of tuberculosis feels well and looks well, even to the critical observer, the only way to find him is through the screening of apparently healthy population groups—through the screening of entire communities. It is this philosophy which underlies the conduct of every community chest X-ray survey in this country and which has been the basis of radiographic activities of the Public Health Service since 1947.

The role of the Public Health Service in the planning, organizing and conducting of such mass surveys, and the problems that will be met in any community in the planning of a survey are detailed in the eight papers brought together in the publication, "Community-Wide Chest X-ray Survey." Except for the introduction by Dr. James Perkins, managing director of the National Tuberculosis Association, and the article by Dr. R. J. Anderson, chief of the Division of Chronic Disease and Tuberculosis, Public Health Service, all of these papers have appeared in the former Tuberculosis Control Issues of *Public Health Reports*.

In the past 5 years the Public Health Service has assisted 17 communities to conduct mass X-ray surveys. In this time 5,800,000 chest X-ray films (70-mm.) have been taken in a total adult population of some 8,800,000. In his paper, "Ra-

tionale and Results," Dr. Anderson summarizes the results of these 17 surveys in terms of participation, X-ray findings, referrals, and established diagnoses. He concludes with an outline of the average experience from chest X-ray surveys.

The six papers previously published cover the survey pattern, nursing, social work, the diagnostic center, medical profession, and records and reports. Each deals with the planning and organization of various aspects of a survey, the role and responsibilities of the professions in presurvey planning as well as in follow-up services. Step by step procedures are outlined and guides for diagnostic referrals and illustrations of various record and report forms are included.

• • •

Community-Wide Chest X-Ray Survey. (Public Health Service Publication No. 222) 1952. 117 pages; illustrations, tables, charts. 30 cents.

Cancer Morbidity Series

Numbers 4 and 5 of the cancer morbidity series are concerned with cancer illness among the residents of Denver, Colo., and Pittsburgh, Pa. Patterned like the first three reports, these publications contain charts, tables, and text on the incidence, prevalence, and mortality rates; age, sex, and color differences; stage at diagnosis; survival rates; and hospitalization.

According to the two surveys, the incidence of cancer apparently increased 26 percent in Denver and 31 percent in Pittsburgh during the period 1937-47. In both cities, a much greater increase was noted among males than females. The incidence of cancer of the lung more than doubled for males and almost doubled for females. Each survey showed that the incidence rates for both men and women were highest in 1947 for the following site groups: digestive organs, genital organs, and skin.

Mortality from cancer has been in-

creasing in the United States since 1900, except for white females, for whom the cancer death rate has leveled off since 1936. In Denver, the cancer mortality rate declined 18 percent among females. Between 1939 and 1947 the greatest increase in mortality from cancer of any primary site was from cancer of the lung and bronchus among males.

These surveys give evidence that early diagnosis is closely related to chances for survival. In the Pittsburgh report, this was clearly shown by the 12-month survival rates for cancer of the uterus. When diagnosed in a localized stage, the 12-month survival rate for uterine cancer was 89 percent. When there was regional involvement, 75 percent of the women with uterine cancer survived for 1 year. This percentage dropped to 15 percent when cancer diagnosis was made after metastasis had set in.

Both reports indicate that cancer patients are receiving better medical care. More patients in the two cities received hospital care in 1947 than 10 years previously.

• • •

Cancer Illness Among Residents of Denver, Colo. Cancer Morbidity Series No. 4 (Public Health Service Publication No. 112) 1952. 39 pages; tables, charts.

Cancer Illness Among Residents of Pittsburgh, Pa. Cancer Morbidity Series No. 5 (Public Health Service Publication No. 126) 1952. 46 pages; tables, charts.

Individual copies of these publications available from the National Cancer Institute, Public Health Service, Bethesda 14, Md.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.



The Practice of Public Health, 1952

Cincinnati, Ohio, May 1, 1873

WE INAUGURATE today the American Public Health Association, the objects of which are "the advancement of sanitary science and the promotion of organizations and measures for the practical application of public hygiene." The field of labor upon which we enter is most inviting to the student of social science and to the philanthropist, for it embraces the highest interests of man and of human society. In its broadest acceptance, sanitary science aims to secure to each individual the most perfect type of the species, immunity from disease, and death from old age, or the natural decay of the structures and functions of the body. The most superficial view of our race discovers the value of a science having such aims, and the momentous task which it proposes to accomplish. On every hand we witness the most prodigal

waste of human life. Inheriting as a birthright health and longevity, we find that man lives but a moiety of his days. Of the children born, what vast percentages never see the anniversary of their birth! What other large percentage dies under 5 years! How few, comparatively, reach the age of 10! At 20 the generation has dwindled to an insignificant minority, and at 33 to 45 it disappears altogether. And even during his short and uncertain life, what physical evils cling like an inheritance to man's body, soul, and estate. . . .

As we contemplate human society in its various stages of development, from that of the savage to the most civilized, from the most ancient to the present time, sickness and death, insanity and imbecility, injustice and violence, everywhere appear as if these were the normal

See next page

a topical and selected report of the 80th annual meeting of the

AMERICAN PUBLIC HEALTH ASSOCIATION

and related organizations held at Cleveland, Ohio, October 20-24, 1952

Reader's guide on page 204

Nathalie Schmidt, M.S., and Edna Murmann, M.S., from the departments of bacteriology and pathology of the Northwestern University Medical School, Chicago, Ill.

Reporting on results shown by a 2-year study of viral complement fixation tests on serums of hospital and clinic patients, they made the following observations:

Many problems must be solved before these methods become completely reliable. Obstacles included the low yield of positive results, the relative difficulty in interpreting virus tests, and the cost of performing them.

Antigen Control Important

The antigens offered are useful to the average laboratory, but since they are prepared as tissue suspensions, and are not pure virus, they are subject to variation. Therefore, tests in which these antigens are used must be carefully controlled.

Serums from clinic patients symptomatically free of acute viral and rickettsial diseases were first tested routinely with complement fixation techniques against the antigens: lymphogranuloma venereum; psittacosis; influenzas A, B, and FM 1; mumps; eastern equine, western equine, St. Louis, and Japanese B encephalitis; rickettsialpox; spotted fever; Q fever; typhus; rabies; screen spotted fever; and screen typhus.

Of the 275 specimens tested for the lymphogranuloma venereum antigen, 18 gave a positive fixation in a titer of 1:2, and only 1 serum fixed complement in a titer of 1:1,024 with this antigen. Medical histories revealed data showing the relation of the history of illness to the type of antibody found in the specimen taken from each patient. Only two patients gave a history of previous illness (one recent, one past infection).

Hospital Patients Tested

After 9 months' experience with the clinic serums, the tests on serums from acutely ill, febrile hospital pa-

tients were begun. Of the hospital serums, 250 were examined against all the antigens listed above except rabies. Additional serums were examined against lymphogranuloma venereum, Q fever, typhus, spotted fever group antigen, and typhus group antigen. Five serums were examined for rabies antibodies. The first test acute phase specimen was stored in the icebox until the convalescent phase specimen was received, and the two specimens were tested simultaneously against identical antigen dilutions and the hemolytic system on the same day.

Virus Infection Confirmed

Of the results obtained from 435 separated viral complement fixation tests on the serums of hospital patients acutely ill at the time the first specimen was examined, those from 14 patients yielded results interpreted subsequently as giving positive confirmatory evidence of virus infection. Of these, seven reacted to mumps virus antigen, two to the antigen of lymphogranuloma venereum, three to the psittacosis virus antigen, and two to the antigens of influenza viruses. Attention was directed to a case of meningitis re-

Tests for viral diseases

Disease	Recommended tests	Material needed
Influenza-----	1. Complement fixation. 2. Hemagglutination inhibition. 3. Virus isolation in establishing etiology of outbreak.	Serum. ¹ Throat washing. ²
Primary atypical pneumonia (including psittacosis, Q fever, and influenza).	1. Complement fixation with antigens of psittacosis-lymphogranuloma venereum, Q fever, and influenza. 2. Cold agglutination.	Serum. ¹
Epidemic encephalitis.	1. Neutralization. 2. Complement fixation with St. Louis and equine encephalitis antigens. 3. Virus isolation (if infection terminates fatally).	Serum. ¹ Brain. ²
Meningoencephalitis.	1. Complement fixation with lymphocytic choriomeningitis, mumps, lymphogranuloma venereum.	Serum. ¹
Rocky Mountain spotted fever.	1. Complement fixation. 2. Weil-Felix.	Serum. ¹
Rickettsialpox-----	1. Complement fixation.	Serum. ¹
Q fever-----	1. Complement fixation.	Serum. ¹

See footnotes at end of table.

ported as due to the virus of lymphogranuloma venereum.

In both the clinic and hospital groups positive titer responses to lymphogranuloma venereum, psittacosis, the influenzas, and mumps antigens were far greater than for the other antigens represented in the study. The only instances in which positive serologic diagnoses were made were for this same series of diseases.

No serologic diagnosis of an arthropod-borne encephalitis was made, nor was a diagnosis forthcoming for any disease caused by the classical rickettsiae.

Army Medical Laboratory Tests Influenza Virus

Studies at the First Army Area Medical Laboratory in New York City indicate that the same serums tested for viral influenza infections suggest greater sensitivity of antibody rise by complement fixation than by hemagglutination inhibition.

The findings were based on results of examination by complement fixation and hemagglutination inhibition of 761 pairs of acute and convalescent serums against the 1940 influenza virus strain B (Lee), reported

by Lt. Col. Andrew Fodor, MSC, and Lt. Col. James L. Hansen, MC.

Obstacles Encountered

Describing the procedures and materials used in their investigation, they reported that an obstacle encountered during the study was the development of erythrocyte agglutinating factors in the serums submitted for examination. These agglutinins were detected in virus-free controls and were usually associated with bacterial and fungal growths which developed in spite of refrigerated storage of the serums. Titrations were rendered unreadable particularly when these agglutination titers extended beyond the virus agglutination-inhibiting capacity of the serum. The difference in sensitivity may be based on the measurement of different antigenic factors, the investigators felt.

Further studies to establish the significance of these observations with a B virus strain isolated during this period are in progress, the officers said.

Texas "Flu" Epidemic Virus Identified

Identification of influenza type B in the 1945 epidemic in Texas and type A' during the 1947 and 1951 influenza outbreaks follows the observations for other parts of the country. The report of the laboratory tests in Texas was made by J. V. Irons, Sc.D., director of laboratories, and Thelma D. Sullivan, M.S., and Margaret N. Norris, B.S., virologists of the Texas State Department of Health.

The laboratory found serologic tests more rewarding in the identification of influenza types than attempts to isolate the etiological agent. Hemagglutination inhibition tests were made on paired serums from typical cases. However, A' virus was recovered from throat washings of two typical cases during the 1951 epidemic.

Tests for viral diseases—Continued

Disease	Recommended tests	Material needed
Mumps.....	1. Complement fixation..	Serum.
Viral keratoconjunctivitis and conjunctivitis.	1. Neutralization with epidemic keratoconjunctivitis and Newcastle disease virus.	Serum. ¹
	2. Virus isolation.....	Conjunctival washings. ²
Inclusion blennorrhea.	1. Microscopic examination.	Conjunctival scraping.
Stomatitis or generalized vesicular eruptions.	1. Microscopic examination for inclusion bodies.	Scraping or biopsy.
	2. Isolation of virus.....	Vesicular fluid or mouth swab. ³
	3. Neutralization.....	Serum. ¹
Lymphogranuloma venereum.	1. Complement fixation..	Serum. ¹
Typhus.....	1. Complement fixation..	Serum. ¹
	2. Agglutination with epidemic and murine rickettsiae.	
	3. Weil-Felix. ³	

¹ Usually two serums are needed; one taken early in the acute phase of illness, the other 12 to 16 days after onset; may be mailed in liquid condition.

² Should be frozen with dry ice and delivered frozen.

³ Useful in presumptive diagnosis of rickettsial infections and helpful in differentiating between Rocky Mountain spotted fever and rickettsialpox.

—From paper by M. Michael Sigel, Ph.D., Philadelphia.

A Century of Progress in Sanitary Engineering

No longer is the sanitary engineer considered merely a civil engineer specializing in sanitation. With the increased recognition of environment as an important factor influencing health, and the changes for the better that the sanitary engineer can achieve in that environment, his role has expanded to the point where he now is constantly attaining greater professional maturity, according to the speakers addressing a joint session of the APHA engineering section and the Ohio Association of Sanitarians.

Public Health "Giants" Of 1890-1910 Acclaimed

Prior to 1890, practically nothing of the actual scientific fundamentals of sanitary science was known, while by 1910, the basic principles of that science had been well and truly established, declared C.-E. A. Winslow, Dr.P.H., editor of the *American Journal of Public Health* and professor emeritus of public health at Yale University.

For more than half that period. Dr. Winslow was a student and instructor at the Massachusetts Institute of Technology. In retrospect, he views those decades in Boston as "one of the most remarkable periods in the history of public health." and he feels that the men he knew had "attributes of real greatness."

"The notable advances of the time were, of course, made possible by the application of the new science of bacteriology," he said. "They were actually effectuated through a peculiarly intimate relationship between the Massachusetts State Board of

Health and a remarkable group of pioneers on the Technology faculty."

Faculty and Officials

"William T. Sedgwick, head of the department of biology, was operating what was, in essence, the first school of public health in the world," Dr. Winslow declared. "Thomas M. Drown was establishing the basis of sanitary chemistry. . . . In 1886, the Lawrence experiment station was set up under the guidance of Sedgwick and Drown. In the 16-foot cypress tanks on the banks of the Merrimac River, the basic principles of the oxidative purification of sewage were first developed; and the Lawrence city filters, in 1883, provided the first scientifically controlled demonstration of water purification. Sedgwick and J. H. Batchelder initiated work on milk bacteriology and began the long battle for pasteurization in 1892. . . . In the Annual Report of the State Board of Health for 1892, Sedgwick presented studies on typhoid fever epidemics . . . which were classics in the field."

On the public health side of this relationship between a State and a university, Dr. Winslow noted Henry P. Wolcott, president of the board of health; Charles Harrington, secretary of the board; and Samuel H. Durgin, health officer of Boston. He named Hiram F. Mills as perhaps the greatest figure in engineering.

Among his more intimate associates, he acclaimed George W. Fuller, who "was responsible for notable pioneer studies of water purification at Louisville and Cincinnati" and who "more than any other one person was responsible for the development of the 'Standard Methods of Water Analysis' of the APHA"; Allen Hazen, who "assisted Hiram F. Mills in preparing the plans for the

Lawrence filter . . . developed the procedures for the mechanical analysis of sand, in use to this day . . . and planned the sewage disposal system for the Chicago Exposition in 1893"; and George Whipple, a member of the triumvirate, with Sedgwick and Milton J. Rosenau, which established the Harvard-Technology School for Health Officers in 1913, and author of "Microscopy of Drinking Water," still the standard work in that field.

Epidemiologist and Teacher

But the "inspiring center of the new movement was William Thompson Sedgwick," Dr. Winslow stated. Not a laboratory investigator, he nevertheless fully realized the importance of basic scientific study. "It was primarily due to his leadership that the laboratories at MIT pioneered in the application of the new tools of science to water treatment and sewage treatment, to the bacteriology of water and milk, of ice and air and food," he noted.

"In epidemiology, Sedgwick played a more direct and personal role . . . was indeed the first scientific American epidemiologist . . . the first to study the phenomena of epidemic prevalence by quantitative methods." He also, according to Dr. Winslow, was "a pioneer in the task of interpreting the possibilities of the budding science of public health to the public . . . a crusader in a new and inspiring cause."

"Most important of all, Sedgwick was an inspired and inspiring teacher," he said. The qualities which made him so, Dr. Winslow explained, were, first, "an almost passionate interest in exactitude as to words and the realities for which words stand and the relationships of words and facts in a universe which was always a connected and significant whole," and second, "his automatic assumption that the basic aim of the individual life was service to the common cause of human progress."

Dr. Winslow concluded that Sedgwick may truly be called a "giant." "I think, however, that he would

have wished me to point out that he did not create his attitude toward life out of whole cloth," he added. "Giants stand on the shoulders of giants. Sedgwick was the inheritor of a great tradition—the tradition of the late Victorians—. . . to which he gave new life and which may still lead us out of the confusions of a changing world . . ."

Claims Sanitary Engineering Deserves New Status

The ever broadening scope of sanitary engineering activities demands a break from the traditional concept of sanitary engineering as merely a branch of civil engineering, declared Earle B. Phelps, B.S., and John E. Kiker, Jr., M.C.E., lecturer and professor, respectively, of the University of Florida's College of Engineering.

"Hippocrates, Pasteur, Chadwick, Shattuck, Sedgwick, and all the others whom we claim as illustrious ancestors in sanitary science are distinguished by their innovations and departures from the traditional," they said.

Modern sanitary engineering began with the discoveries of the water-borne characteristics of enteric diseases which, in turn, led to studies of possible preventive measures, they continued. But in recent years the responsibilities of the sanitary engineer have so expanded that he now must cope also with problems of stream and atmospheric pollution, milk and shellfish sanitation, industrial and school hygiene (including ventilation and lighting), rodent control, restaurant sanitation, and many others.

The term "public health engineering" was coined to emphasize this broadened concept of sanitary engineering as a field embracing all aspects of environmental sanitation in contrast to the earlier, more narrow concept, they said.

They concluded that training in basic engineering subjects obviously is essential, but if sanitary engineer-

ing is to achieve maturity as a unified science such courses as bacteriology, parasitology, and (quantitative analysis) chemistry also must be included in undergraduate curriculums.

Environmental Conditions Cause Fifth of Deaths

An estimated one-fifth of all deaths in the world are due to environmental conditions such as unsanitary water supplies, and lack of effective control of flies and insects, of cholera, and of bilharziasis, stated Herbert M. Bosch, M.P.H., professor of public health, Engineering School of Public Health, University of Minnesota.

"The rise of the United States to a position of world leadership has made it mandatory that Americans think of global health problems. . . . World leadership has brought with it a responsibility for world health," he asserted.

The solution of the sanitation problems in any country will be one which fully utilizes local labor and material and which does not deviate too widely from the local cultural patterns. American sanitation methods may not be satisfactory in a foreign country, he pointed out.

Safe Water a Problem

For example, he noted, it would be economically impossible to supply enough hand pumps and well casing for all the small villages in Africa and Asia. Supplying safe water for such small villages is thus still a problem. In many parts of the world, he continued, human excreta is used for fertilizer, and no method for such use has been developed which satisfies both the sanitary engineer and the peasant.

The continued success of sanitation programs in any country depends on a core of nationals competent in public health engineering, he said. Urging establishment of training centers in other countries, Mr. Bosch felt more benefit would

be gained by giving training in regions nearer environmental conditions native to the trainees.

On the question of whether service in foreign countries is a satisfying professional experience, Mr. Bosch said: "Many . . . derive satisfaction from being able to do work which has such measurable results. Those who have been most successful are men who are willing to learn from a country as well as to teach, who like to work with people, who do not have a feeling of superiority, and who attempt to understand and appreciate the culture of the country in which they are working."

To Solve Modern Problems Teamwork Is Required

Engineers in public health cannot rest on the laurels of their past performances, since tremendous responsibilities lie ahead in many of the underprivileged areas of the world and an untold amount of work confronts them in many parts of this country, asserted Rolf Eliassen, Sc.D., professor of sanitary engineering at Massachusetts Institute of Technology, in a talk on environmental health for the next century.

Throughout his presentation Dr. Eliassen called for "unsurpassed" cooperation between engineers and other scientists in public health. Almost every modern problem, he said, calls for teamwork with a different set of public health scientists.

Waste Disposal

Refuse disposal is a major engineering problem in most cities. It has been estimated that 8,000 communities need modern refuse disposal facilities in this country alone, not to mention those communities which need modernization of sanitary equipment and methods, he reported.

Sewage and industrial waste treatment plants should be improved. We need faster acting, smaller, and cheaper treatment plants in order to promote water pollution abatement, he said.

Agriculturalists all over the world are clamoring for more organic fertilizers and humus material to build the soil and maintain high productivity, Dr. Eliassen commented.

More economical and more readily applied methods of insect control are needed, he noted.

Food Sanitation

Food sanitation, although quite well developed, "stares us in the face" when reliable sources estimate that there are about 1,000,000 food poisoning cases a year, he said. Although dishwashing has been advanced by engineering, the methods of desoiling and storage of dishes could be improved to keep the dishes sanitary, he noted as an example.

Housing

The hygiene of housing is a tremendous task facing the profession. Home accidents, a major source of disability and mortality, must be fought as well. Leadership for the enactment and enforcement of rational housing standards, for the construction of new housing, for rehabilitation of substandard housing, and for adequate maintenance of approved housing must be furnished, according to Dr. Eliassen.

Air pollution is a problem demanding much research by allied scientists, he reported. Problems now unknown will also face the profession in the future.

Simple and inexpensive means of securing good water for the underprivileged areas of the world should be developed, Dr. Eliassen concluded.

Urges Engineers Study Environmental Stress

Since the primary concern of sanitary engineering is the control of environmental stresses upon man to maintain health and well-being, its principal objective, in the opinion of Theodore Hatch, M.S., is to anticipate and prevent excessive environ-

mental problems rather than to correct bad situations after they have developed.

Mr. Hatch, who is with the University of Pittsburgh's Graduate School of Public Health and the Mellon Institute's Industrial Hygiene Foundation, said that sanitary engineers must develop a deep understanding of man-environmental relationships—a knowledge of human response to environmental stress which can be translated into engineering terms and wedded with basic engineering knowledge and skills. He felt that such knowledge permits human factors to be dealt with in engineering analysis and design on a par with physical laws which govern ordinary engineering practice.

But human behavior is complex and cannot be reduced completely to equations, Mr. Hatch continued. The sanitary engineer must distinguish between emotionally evalu-

ated and descriptively handled behavior aspects and the man-environmental relationships which meet engineering criteria. Nor can he work independently, said Mr. Hatch. The translation of laws of human response to environmental stress into engineering terms for regular use in analysis and design requires the participation of biological and medical scientists as well as sanitary engineers, and the field is therefore an overlapping one that must be developed and shared equally by the two groups.

There is still a need for engineering skills in the control of infectious diseases, and the need will continue until adequate sanitation is provided for all the people, he said.

But "the need in new areas for joint research and close collaboration of engineers and other physical scientists with biological and medical scientists is even greater," he emphasized.

Practice of Public Health, 1952—Part II

Reader's Guide

	Page		Page
Virus laboratories.....	199	Water and sewage.....	245
Environment.....	202	School health research.....	248
Anthrax	205	Dental health.....	251
School health policies.....	207	Public health surveys.....	254
Industrial hygiene.....	209	Handicapped children.....	256
School health practices.....	213	Food sanitation.....	260
Mother and child.....	218	Animal diseases.....	263
Fluoridation	220	Fly control.....	267
Health education.....	224	Medical service.....	269
Nursing homes.....	228	New elements.....	273
Health administration.....	229	Statistics	277
Water conservation.....	234	Public Health in Transition—	
A better environment.....	236	A pictorial album begin-	
Dairy products.....	243	ning on page.....	297

Epidemiological and Control Aspects of Anthrax

The 1951-52 outbreaks of anthrax in animals were reviewed in epidemiological and preventive terms during sessions of the Conference of Public Health Veterinarians and the APHA engineering, epidemiology, food and nutrition, and laboratory sections. Reports were presented on bonemeal as the source of infection in Ohio swine, on the control problems, and on economic effects. An increase of human anthrax of industrial origin was also noted.

CDC Veterinarian Outlines Anthrax Control Measures

Numerous outbreaks of animal anthrax in the United States during 1951-52 were traced to contaminated bonemeal, said James H. Steele, D.V.M., M.P.H., chief, veterinary public health services, Communicable Disease Center, Public Health Service.

Most cases occurred in Ohio, Indiana, and other midwestern States, he noted. Michigan reported its first case since 1916. None of the States were considered anthrax enzootic areas, he said.

Anthrax was prevalent in cattle, horses, sheep, and mink, but most outbreaks were among swine. Nearly all the diseased hogs were pregnant or nursing sows on a high protein-calcium ration, he said.

No human cases were attributed to any of the swine outbreaks, Dr. Steele stated.

Control Measures

The U. S. Department of Agriculture now prohibits importation of

raw bonemeal. It also requires that any bonemeal brought into the country be sterilized at 250° F. under 20 pounds' pressure. Many States have similar regulations, Dr. Steele reported. In the Ohio outbreak, he observed, penicillin or other antibiotics were preferred to immunizing agents in controlling anthrax in swine. But in treating cattle, penicillin is not recommended in place of vaccination because relapses have followed injection, he said. He pointed out that aureomycin and terramycin were successful, however.

Even though anthrax is not readily transmitted to man, control measures for handling milk from infected premises, for processing meat animals from known infected farms, and for preventing occupational disease among animal handlers are needed to remove any threat to public health, Dr. Steele stated.

Prevention of occupational anthrax can best be answered by health education, he concluded. Meat animals from infected farms should be processed in abattoirs or packing plants under Federal or local inspection services, he said.

Quarantine of the premises does not always answer the problem of handling milk from a farm where anthrax has infected a milking herd or other animals, he said. Unduly stringent quarantine regulations may discourage reporting of the disease and cause economic loss for the dairyman, he warned.

"I have had the opportunity to see some sizable nuisance problems develop when the milk from 500 or 600 cows is dumped on a farm in a warm climate," he observed.

Proposed Dairy Control

Dr. Steele read proposed Public Health Service recommendations for controlling anthrax in milk herds.

Presented a week in advance of discussion at the Louisville convention of the U. S. Livestock Sanitary Association, the rules were drafted with assistance from the U. S. Bureau of Animal Industry, the Federal Food and Drug Administration, the Federal Civil Defense Administration, the American Veterinary Medical Association, and the U. S. Livestock Sanitary Association. They stipulated that:

No milk be sold from suspected animals until a licensed veterinarian declares them anthrax-free; animals with temperatures of 103° F. or other signs of the disease be isolated from the milking herd; milking utensils be sterilized for 30 minutes after exposure to contamination; and dairy barns be thoroughly cleansed by washing and treatment with a 5-percent lye solution for 2 hours after discovery of the disease.

The regulations call for reporting of cases to the local health officer and veterinarian, control of the disease by the local health department and State livestock sanitary officials, and close cooperation between the milk and livestock disease control authorities.

Economic Losses Result From Anthrax Outbreak

The 1952 outbreak of anthrax in Ohio affected the economics of many phases of the Ohio livestock industry, according to the report presented by James R. Hay, D.V.M., chief of the division of animal industry, Ohio Department of Agriculture.

Although the loss incurred by deaths of affected animals (brood sows) was not significantly high, averaging 1½ animals on each of the 287 affected farms, the outbreak had detrimental effects upon such economic factors as swine feeding practices, the sale of swine, interstate movements of all livestock, and even the sale of milk, he said.

The major loss suffered by the swine industry resulted from the

changes in feeding practices, Dr. Hay believes. The knowledge that contaminated raw bonemeal had caused the outbreak led many breeders and feeders to discontinue the use of mineral feeds, despite the fact that the manufacturer of the contaminated product had recalled all unused portions.

Many breeders also ceased purchasing commercial supplements because they contained bonemeal or animal protein, he reported. Vegetable proteins were frequently substituted for animal protein. Moreover, in some instances feeders wasted money by increasing the antibiotic in the feeds over the known "growth factor" level.

Many packers and processors refused to purchase swine from any farm located in a county where anthrax had been diagnosed, Dr. Hay also pointed out. This in turn precipitated fear in the minds of some producers, who sold their swine for slaughter before they had reached ideal market weight.

Further economic losses undoubtedly resulted from outbreaks of hog cholera during the summer of 1952, some of which may be attributed to the fact that farmers did not have their swine vaccinated during the anthrax period, Dr. Hay indicated.

The occurrence of anthrax also affected milk producers since in some

instances milk from dairy farms having affected swine was rejected. Some local sanitary boards refused to permit the flow of milk into regular channels from quarantined farms regardless of sanitation, management, and isolation practices.

However, the outbreak stimulated a desire for an efficient state-wide meat inspection program. "The use of sterilized used feed bags will have a far-reaching effect in minimizing the spread of many livestock diseases," he concluded. "The new Federal regulations governing international shipment of animal feed-stuffs will likewise provide security."

Epidemiology of Anthrax In the United States

Human anthrax of industrial origin has increased in the United States during the past decade, especially in the New England and Middle Atlantic States, Arthur H. Wolff, D.V.M., of the radiological health training section, Environmental Health Center, Cincinnati, reported.

The infective agents, he said, are imported goat hair, goat skins, and carpet wool from Asia, North Africa, and possibly southern Europe. Although there has been an increase in reported cases in man, the annual

average has been less than 70 cases during the past 11 years, 75 percent of which were industrial in nature and were attributed to animal materials. Since the introduction of penicillin therapy, few or no deaths from cutaneous anthrax have been reported when diagnosis and treatment were reasonably early.

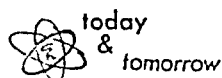
Worst Anthrax Outbreak From Imported Bonemeal

Anthrax spores imported in 1952 in raw bonemeal were the cause for the most severe anthrax outbreak in swine on record in Ohio, according to H. G. Geyer, D.V.M., and H. E. Goldstein, D.V.M., former chief and field investigator, respectively, of the division of animal industry, State Department of Agriculture.

The sporadic outbreaks of 1916, 1923, and 1951 had involved only one or two farms in the State, but the 1952 epidemic spread into many counties, they reported. However, there was a loss of only 384 hogs from 264 farms, and the disease did not appear to spread to other animals.

Prompt reporting by veterinarians, adequate quarantine, and early administration of penicillin and anti-anthrax serum were the control measures which brought success to the program, they stated.

public health in transition



This past half century has witnessed an evolution in traditional public health activities. The task of basic sanitation continues, but takes on new dimensions. We move against communicable disease not in terms of containment, but of prevention—in some cases, of eradication. Today's laboratory is essential to epidemiology, diagnosis, treatment—and itself

breaks new paths in research. In shaping our course of action we rely upon data acquired through the nation-wide cooperative system of vital records and health statistics—another product of these 50 fruitful years.

Meantime, new concepts, new programs, have come into being. Even a partial listing of areas of public health practice of common acceptance today would include . . .

Community health education . . . professional training . . . tuberculosis and venereal disease control . . . school health . . . nutrition . . . malaria and insect vector control . . . public health nursing . . . water pollution control . . . occupational health . . . diabetes

control . . . mental hygiene . . . cancer services . . . epidemiological, administrative, social, clinical research . . . medical care . . . dental programs . . . maternal and child health services . . . housing and health . . . rodent control . . . radiation protection . . . heart disease control . . . multiple screening . . . hospital planning and construction . . . rehabilitation . . . blood programs . . . accident prevention . . . civil defense.

Today's public health programs have emerged in response to recognized needs. Action has come with advances in the biological, physical, and social sciences. The pictures following highlight some of these current and developing fields of local, State, and Federal health services. ▶

Policies for the Promotion Of Healthful School Life

A joint session of the APHA sections on maternal and child health, public health education, public health nursing, school health, and health officers with the American School Health Association sought to bring up to date developments in the field of school health policies. Among topics discussed in light of the forthcoming revision of the standard reference under this title were: promoting healthful living in schools, health and safety education, services for health protection and improvement, health aspects of physical education, and school responsibilities for the education and care of handicapped children.

Outlines Major Revision In School Health Policy

Redirecting school health education would clarify current school health policies, Helen M. Starr, Ph.D., director of health, physical education, and recreation for Minneapolis Public Schools, declared.

"We are not carrying out the recommendations of the present report," she said, referring to current APHA policy carry-over to present health education. Many schools are teaching health rather than helping boys and girls live healthfully through sound instruction, she said.

"Why not tie in the aspects of health service and healthful school

This album material (and last month's) is adapted from the Public Health Service exhibit at the 1952 APHA meeting.

living with the program of health and safety education in revising current policies?" Dr. Starr asked. Listing the services and living activities which are a regular part of the health curriculum would contribute to program integration, she said.

Dr. Starr appealed for major policy restatements on the objective of health education, coordination of the program and integration of its various parts, organization of the health course, introduction of a health program into the schools, and more specific standards of guiding the program.

Instruction Objectives

Primarily, a policy revision should state the understanding, attitudes, and skills to be achieved by health education in a complete curriculum, Dr. Starr said. Its formulation would serve to determine the content of health courses, the needed school and community health services, and later to evaluate the effectiveness of health teaching, she

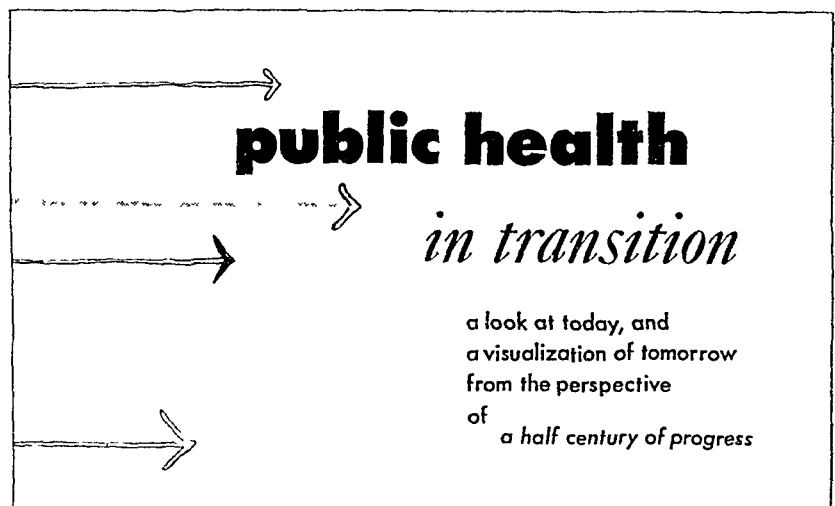
believes. As examples of understanding, she listed:

Good health is a state of complete physical, mental, emotional, and social well-being, not merely the absence of disease. Individuals differ in their rate of growth and in their capacities. Their acceptance of this difference is necessary to good mental health. Complete medical, dental, and psychiatric services are available for improving health.

Desirable attitudes, she said, are appreciation of preventive medicine and public health education programs, cooperation in maintaining high health standards in the home, school, and community, and acceptance of one's strengths and limitations.

Suggested health teaching areas to be included at each level of the school experience are these, she said: human growth and development; health maintenance and improvement; dental health; nutrition, rest, relaxation, and exercise; personal appearance, mental health, and personality development; home and family living; alcohol; narcotics and drugs; safety education including civil defense and disaster education; and public health.

"The health course should carry the same recognition in regard to credit and requirements as other basic courses," she said.



Capacities Only Limit For Handicapped Child

Handicapped children should be helped to participate in activities with normal children to the extent of their capabilities, declared Arthur J. Lesser, M.D., director of the Division of Health Services of the Children's Bureau, Federal Security Agency.

The physical, intellectual, social, and emotional needs of crippled children are basically the same as those of other children, he said. Although they may find the problems of growing up accentuated because of their handicaps, they can best face the rest of the world if they learn to do so from early childhood.

"With our help," he continued, "they can develop to the extent of their physical and mental capacities and most of them can become independent contributing members of society." He said this requires a well-planned community health and education program that includes case finding, diagnostic and treatment services, social services, education (including special education), and vocational counseling.

For children too handicapped for education in regular classes, Dr. Lesser continued, special classes are becoming increasingly common. However, too few schools now have such programs since provision for educating orthopedically handicapped children, for example, should include: transportation by bus with an attendant or by taxi, ramps and elevators, close medical supervision by pediatricians and orthopedists, physical and occupational therapy, hot lunches, specially trained teachers and other personnel, and rest facilities.

Problems Differ

The best type of school situation for the handicapped child must be determined by each individual's requirements, Dr. Lesser stressed. Some children may be so handicapped that they are unable to attend regular or special classes and there-

fore must be educated in special schools, hospitals or their homes. Also, he said, orthopedically handicapped children may present different educational problems than, for instance, those with cerebral palsy, epilepsy, or hearing difficulties.

Some handicapped children, particularly epileptics, are excluded from or are unhappy in school because of social stigmas attached to their disorders, said the doctor. He felt that they should not be excluded and that the other children's reaction toward the handicapped child will mainly reflect the attitude of the teacher.

In fact, he concluded, handicapped children should begin their formal education much earlier than normal children. When children have serious neuromuscular or hearing handicaps, he said, the preschool years become particularly important for their growth and development. He felt that although only a start has been made, the nursery school movement for the handicapped gradually is becoming more influential.

Schools Should Blueprint Plans for Health Action

Formulation of a well-publicized written plan assuring uniformity of intelligent action in emergencies, protection of children against neglect, and prevention of communicable disease will act to reduce unjustified criticism of schools, Carl A. Wilzbach, M.D., commissioner of health, Cincinnati, said in discussing school health protection and improvement.

School personnel, with aid of local medical societies, should draw up such blueprints to solve problems such as the safe transfer of responsibility to parents or other persons when emergencies occur and the treatment of children injured or taken ill when parents cannot be reached, he said.

Accidents and illnesses are bound to occur in schools, and a program of action including teacher training in

first aid procedures will prevent further injury and assure the family that needed medical services are obtained as promptly as possible.

Dr. Wilzbach outlined the need for keeping files of names, home and business addresses and telephone numbers of parents and neighbors, and a current active system of accident reporting. He also stated that schools have a direct responsibility in the prevention and control of communicable disease, and should establish cordial working relationships between schools and health departments and local medical societies. He advocated the services of a medical adviser for every school.

During the school years, Dr. Wilzbach urged that students should have a minimum of four medical examinations; one at the time of entrance, one in the intermediate grades, one at the beginning of adolescence, and one before leaving school. He also stressed the importance of referral of examinations to doctors selected by the students' parents.

The speaker felt that community resources should be made available to meet the health needs of school children, particularly specialized medical consultation of a diagnostic nature.

Broader Health Course Advised for Teachers

Use of a physician's services in a school's physical education program and better preparation in the biological sciences for physical education teachers were stressed by Herbert F. Walker, Ph.D., professor of health education, Columbia University Teachers College, in a discussion of practices and policies that create a healthful climate for athletics and physical activities.

The general requirement that all school pupils take part in the physical education program presents potential health problems, he said. Individuals vary widely in their capacity to perform muscular ac-

The Scope and Characteristics Of Occupational Health

tivity. A physician is needed to classify the pupils according to physical fitness.

In the interest of pupil adjustment, Dr. Walker said, it is usually recommended that the pupil be kept on the class roster and given academic credit for the things he can do.

In addition to the customary medical services in interscholastic athletics, Dr. Walker suggested a closer identification of the medical staff with administrative decisions that relate to health, such as the length of the playing season or the practice sessions.

Dr. Walker found the present requirement of teacher certification for athletic coaches a far cry from the practice of accepting volunteered services of a former athlete to coach the school team. He also indicated progress in specifying course work.

But additional emphasis, he stated, could well be placed on public health problems, human growth and development, and health counseling in the preparation of the physical education teacher.

"School Health Policies," Revision in Preparation

"Suggested School Health Policies" is to be revised for the second time, Charles C. Wilson, M.D., professor of education and public health, department of public health, Yale University, announced.

This booklet, prepared by a committee of the maternal and child health section with advice from other APHA sections and several national organizations concerned with school health, was first published in 1940 and revised in 1945, Dr. Wilson noted. It is designed "to provide a clear, comprehensive, printed statement of the consensus of well-informed professional opinion concerning many specific school policies which directly or indirectly affect the health of children and adults," he said.

The scope and characteristics of occupational health programs are undergoing modifications in keeping with new industrial processes and changing concepts of industrial-community relations, health officers and industrial hygienists were told at the APHA.

Air Pollution, Isotopes Concern Health Units

Air pollution and the use of many new chemicals and radioactive isotopes in industry and medicine are among the challenging problems facing the local health officer in the often neglected field of industrial hygiene, according to Huntington Williams, M.D., commissioner of health of Baltimore.

Dr. Williams traced the 30-year history of Baltimore's efforts in the field. Revision of the State's workmen's compensation law gave the State and city health departments responsibility for controlling and

preventing occupational diseases and permitted them to adopt regulations. The cooperation between the health and labor departments, and later, the city buildings engineer, produced good results.

Confidence in the program developed, and management and labor began to seek guidance on health protection from the department, he said. A senior medical supervisor for occupational diseases was appointed. Close working relationships with official and civic groups were found necessary for an effective program, he said.

Lead Poisoning

Lead poisoning was found to be an occupational hazard in Baltimore and a special blood-lead laboratory was set up to help pin down this disease in and out of industry. Children of teething age who had chewed on window sills were found to have become severely ill from the lead paint used at one time. The blood-lead laboratory helped in diagnosing this disorder, he said.

Another community service cited by Dr. Williams was the tracing of

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the attack
on
chronic
diseases



a "grain itch" type of dermatitis to an insect mite in a broom factory. The owners of the firm had requested the investigation.

Community Benefits From Industrial Medicine

Industrial medicine has achieved significant results in prevention and control of occupational injuries and diseases and, through cooperation with community health services, has contributed to the control and prevention of venereal diseases, pulmonary tuberculosis, and other infectious diseases, said C. D. Selby, M.D., resident lecturer in industrial hygiene, University of Michigan School of Public Health.

The responsibilities of both industrial medical services and community health programs are essentially those of private physicians, he asserted—the protection and preservation of community health. He felt, however, that because of their positions in industry and the specialized knowledge they possess, industrial physicians acquire additional obligations of mass "health maintenance."

The procedures of industrial health which offer the best opportunities for cooperation with community health programs, Dr. Selby continued, are: (1) examinations of applicants for employment; (2) employee examinations for health maintenance; (3) case finding; (4) consultation and advice to employees on their health problems; (5) health education; (6) industrial hygiene and sanitation; and (7) biostatistical studies of both occupational and nonoccupational employee disabilities.

Examinations Are Multiphasic

As an example of the opportunities these "tools" offer for cooperation with community health programs, Dr. Selby cited the examinations which assist greatly in multiphasic screen testing. Employee examinations are multiphasic and much more

complete and clinically sound than most community testing programs.

The industrial physician is interested in virtually the same health problems as the health officer, Dr. Selby continued, since both influence the quantity and quality of employees' work. He felt that they should cooperate especially in problems of accidents, home environment, occupational hygiene, chronic diseases and constitutional conditions of the aged, referral of patients to needed specialists and hospitals, rehabilitation of the crippled and disabled, and mental hygiene.

Periodic Health Survey Benefits Discussed

Periodic health examinations provided by many corporations for their employees should not be in competition with diagnostic clinics nor the practice of medicine in the community, said W. Leigh Cook, Jr., M.D., assistant professor of medicine, University of Pittsburgh.

He pointed out that corporations and groups of industrial workers have undertaken this preventive activity because a large number of people fail to seek a regular check-up.

In this type of examination the person is being screened for telltale evidence of lack of good general health, and, said Dr. Cook, he should not expect exhaustive diagnostic procedures.

Advantages of Check-Ups

One of the advantages to be gained from a periodic examination, according to Dr. Cook, is that the patient actually presents himself to a physician for an examination. The examination will also make the patient realize that his health is important not only to himself but to the corporation, he said, pointing out that a healthy employee is a good employee, while a sick employee is likely to make mistakes that cost the corporation needless losses.

Dr. Cook listed as a third advantage the discovery of infectious or degenerative disease processes, such as diabetes, hypertension, progressive arteriosclerosis, tuberculosis, anemia, leukemia, and tumors, which have not been noted by the patient. The patient with physical disabilities will be reassured concerning management of his problem, he said.

The last advantage outlined by Dr. Cook was the maintenance of individual records over a long period of time. These base-line laboratory and objective findings are important in evaluating a sudden illness or symptoms that might stem from a particular organ which has shown an abnormality in the periodic examination, he explained.

What To Include

Dr. Cook expressed the belief that adequate information for periodic survey purposes can be obtained from a careful medical history, functional inquiry, a complete physical examination, a blood count with differential, a complete urinalysis, an X-ray of the chest or an adequate fluoroscopic examination, and an electrocardiogram. He advised that records of these examinations be made available to family physicians. Those who have specific complaints should not be diagnosed in a periodic survey, but should go to their own physicians or diagnostic clinic, he said.

Basic Information Needed To Control Radiation

Without base-line information as to whether there are any appreciable number of people exposed to radiation in biologically significant amounts and how much of an increase in radiation would be required to reach such a level, it is difficult for public health departments to know what course to chart in the problems posed by the possibility of long-term radiation exposure, in the opinion of Duncan A.

Holaday, M.A., chief of the Salt Lake City radiation unit of the Division of Occupational Health, Public Health Service.

Questions for Health Officers

He said health officials should concern themselves with challenging questions such as these:

Just what are the radiation sources in your area and where are they located? Are all the X-ray machines situated in hospitals, doctors' and dentists' offices, and industrial establishments? Is this equipment properly safeguarded and by whom? Is any effort made to measure and record the exposure of the technicians who control this equipment? How much of the 600 gm. of radium used to make luminous paint in the last 10 years has come to rest in your area? What levels of radon are normally present in your area and how do atmospheric conditions affect these concentrations? How is the radium content of water affected by treatment schedules?

Geneticists have spoken out in plain words on the danger of receiving a lifetime dose of from 30 r to 80 r, and their opinions should be given more than passing attention, Mr. Holaday warned.

Geneticists report that such a dose would double the spontaneous mutation rate, Mr. Holaday explained.

Radiation is known to induce inheritable changes or mutations in animals, he continued, adding that humans are probably more sensitive to radiation than most animals. In contrast to most radiation effects which indicate that small radiation doses are not directly additive, genetic studies show that fractional irradiation doses have a cumulative mutagenic effect.

Sources of Radiation

Mr. Holaday presented data on small doses of radiation and listed the sources of radiation to which an average person may be exposed. These, he said, are:

Cosmic ray background. Exposure is estimated to be at least 0.1 r per year. This is inescapable.

Small amounts of radioactive elements which are distributed in water, soil, and air. If these were evenly distributed, which they are not, throughout the skeleton, they would deliver a radiation dose of about 0.8 rep per year to the bone.

Natural radioactive materials used in industry. Workers in carefully monitored installations receive total exposures far less than 15.6 r per year, the maximum permissible dose.

Doses from common diagnostic procedures used by radiologists. Some of these quantities are: chest, large X-ray, 0.1 r; chest, photofluoroscopic, 1.0 r; pregnancy, lateral, 9 r; gastrointestinal series, 4 r to 50 r; average dental film, 5 r; fluoroscopic examination, 10-20 r/min.

Instances of the use of radiation for such trivial purposes as the removal of superfluous hair.

Customer Can Rely on Chemical Suppliers

What are the chemical supplier's responsibilities to his customer? Edgar M. Adams, Ph.D., assistant director of the biochemical research department, Dow Chemical Company, Midland, Mich., answered that the supplier can be expected to inform the customer sufficiently

about the health hazards of his product.

Accordingly, he said, the supplier must obtain information on harmful properties of chemicals, advise customers of these properties and of precautions, and assure that the uses he recommends are appropriate. Only indirectly can the supplier influence the operations of his customer.

Types of Hazards

"The likelihood that a given product will cause harm of any sort will depend upon chemical and physical properties, toxicity, use of the product, and the type and number of customers," Dr. Adams pointed out. "A substance used as a chemical intermediate cannot offer a hazard even approaching that presented by substances going into such products as cosmetics, fabrics, and pesticides. Each individual use must be evaluated on the basis of the nature and intensity of the exposures which can occur. Entirely apart from the likelihood of difficulty, the seller of chemicals will assume a varying liability for the safe use of his products depending upon the type of product and the conditions of sale."

He added that "virtually no liability may be assumed when the use of the chemical is not known to the supplier."



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construction of
health facilities



Because the chemical industry is characterized by variability with respect to products and their uses, customers, marketing procedures, and conditions of sale, the supplier must evaluate these factors for each product before meeting his responsibility for safe use, Dr. Adams said. Economically, it is not always feasible or effective to treat all chemicals alike. The producer of new chemicals must first obtain information on their chemical, physical, and physiological properties. Dr. Adams described three classes of tests to determine these.

Classes of Tests

Class 1 tests measure acute toxicity primarily, require but a small sample, cost but a few hundred dollars, and can be completed within 4 weeks. Their results form a basis for so-called handling precautions.

Class 2 tests are more extensive, yielding relatively precise measurements of acute toxicity and estimates of chronic toxicity, requiring about 6 months, and costing as much as 3 to 4 thousand dollars. They are conducted when the appropriateness of specific uses must be determined, or simply because of the wide distribution of an industrial chemical.

Class 3 tests are the most comprehensive and require hundreds of animals, or at times human subjects, 2 to 3 years for completion, and 30 to 40 thousand dollars. They are conducted when the use of a chemical requires a high assurance of safety and when a thorough understanding of toxicity is desirable because of widespread and diverse use.

The Manufacturing Chemists' Association has developed a system of labeling and promoting uniformity, the speaker stated. "The individual company has the task of designing proper labels and setting up procedures which assure the labeling of each container."

"The procedure of marketing may be utilized to assure the safe use of products which present hazards of exceptional seriousness and which require extensive precautions or pre-

cautions which are outside past experience of the customer," he said.

Occupational Diseases From Raw Materials

Surprisingly, occupational diseases associated with importation of raw materials into the United States have received comparatively little attention, commented Daniel C. Braun, M.D., medical director of the Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, and John F. Osteritter, M.D., M.P.H., Graduate School of Public Health, University of Pittsburgh.

Limiting their discussion to a review of disease hazards from raw materials prior to processing, Drs. Braun and Osteritter said that handlers of raw materials are subject to many infections and infestations, numerous dermatoses, and certain pulmonary diseases such as asthma and pneumoconiosis. In addition, raw materials have been suspected of being involved in the causation of systemic diseases—notably cancer, and metal poisoning.

Human Anthrax

They named as one of the most common infectious diseases human anthrax, which occurs in all stages of the handling, transportation, unloading, processing, and weaving operations of wool and hair, and in the tanning of hides and skins. The incidence of industrial anthrax in the United States has shown a significant increase since 1939, attributable to increased importation of wool and hair for carpet manufacture, Drs. Braun and Osteritter indicated.

The reviewers listed other disease hazards in the infectious group: glanders and hoof-and-mouth disease related to the importation of livestock and derivative products; Q fever from handling goat hair, raw wool, dairy products, meat and stock; psittacosis from contact with birds of the parakeet family and their plumage; actinomycosis from contact with straw and certain an-

imals; "sealfinger," the colloquial name for a disease found among men who gather and handle seal pelts; and tetanus encountered in the handling of jute. Weil's disease, pemphigus, tularemia, tuberculosis cutis, schistosomiasis, malaria, yellow fever, and filariasis are contracted from rodents and insects infesting ships and coming in contact with cargoes.

Dermatitis Sources

Insect infestation is a major source of dermatitis. The parasite *Pediculoides ventricosus* and related organisms are thought to be etiological agents for a variety of itches, they said. Grain itch appears in epidemic proportions among workers handling rice, barley, and wheat. The lesion is frequently seen on the faces and necks of workers who carry sacks of contaminated material on their shoulders. Water itch is found among coolies working on tea plantations and others who handle tea. Cottonseed itch occurs among workers handling contaminated seed in bulk quantities.

Hookworm is another pest, Drs. Braun and Osteritter indicated. Its larvae are often contained in bits of mud, causing contamination in the bags, barrels, or boxes of rice, cocoa, and similar materials from Japan, South America, Puerto Rico, and the East Indies.

Dermatoses also result from contact with vegetable fibers, plants, and woods, the reviewers continued. Among causative agents are the Japanese lacquer tree, the Indian marking nut, the cashew tree, and the Singapore mahogany, all members of the notorious poison-ivy botanical family. Lemon grass oil used in perfume and as an adulterant for lemon oil is a potent producer of dermatitis. Figs and bananas have also produced skin irritations. Other malefactors include lance wood, imported from Cuba, Brazil, and Guiana and used for wagon shafts and handles; boxwood, walnut, rosewood, and cocobolo wood from the West Indies; and ebony from Brazil.

Philosophies and Practices In School Health

Sessions of the American School Health Association's meeting in Cleveland dealt with a wide range of topics, including an analysis of the philosophy and principles of the school health program and a review of trends in mental and dental health and in school nursing. In an examination of school education, the scope and scheduling of instruction for grades 1 through 12 were considered, together with a consideration of the preparation and placement of health teachers.

Basic Principles Underlie School Health Programs

Man is an indivisible entity; a co-operative group effort is a necessity; and any phase of education must reflect and demonstrate the democratic way. These are the three basic considerations which "must underlie our thinking and planning in school health education," declared Delbert Oberteuffer, Ph.D., professor and chairman, department of physical education, Ohio State University.

Discussing these considerations, Dr. Oberteuffer pointed out that although the concept that man—the child or student—is a unified whole, "not a segmented animal," is not new, "only recently have we begun to understand this unity and to act in accordance with its meaning."

"Whatever is done in health education," he said, "whether it is the teaching of an activity for endurance, examining the mouth for dental decay, or requiring knowledge of immune processes, must be done in relation to the problem presented

by that whole and individual organism . . . The full measurement of value in health education is its production of good for 'me,' not for 'my eyes' or 'my weight' or 'my body.' In modern health education the concept of 'body' disappears. So does the concept of health education as good for any fragmented part. In its place is the evaluation of the effect of health education upon the individual as a person."

Responsibilities

The second principle Dr. Oberteuffer discussed concerned administrative jurisdiction, overlapping responsibilities, and uncertain boundaries. "There are so many of us involved [in school health programs]," he said, "that for years we have struggled with the curious element of protocol that seems to surround us when educators, physicians, nurses, dentists, and others try to work cooperatively in a cooperative program."

He urged that all concerned carefully examine the situation. "The school health program requires many people to make it operate suc-

cessfully," he said. "Responsibility for the health of youngsters belongs to all who deal with them. Many talents are needed—medical, educational, nursing, administrative, psychiatric, and more. Why argue about which talent is the most important? What we have to realize is that we are all important to the welfare of the child . . ."

Moral Values

The third consideration involves the moral values within the school health education program. "We must examine the relationship between school health education and the social and political philosophy of our people," he said. "Whatever we do in the name of school health education must meet the needs of the people. But in meeting those needs for medical care or for health advice . . . we must not destroy the capacity for self-direction and the will of the individual to look after himself and his family."

"But, withal," he concluded, "let none of us forget that school health programs exist because American school children have the right to the best that science can offer to aid in their development. The Nation has the right to expect that we who are strategically placed to aid them in this development will bring every advantage to them."



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Teachers Need Training In Mental Health Concepts

It is generally estimated that 1 school child in 10 is emotionally disturbed and would profit from clinical services, Louis Jacobs, M.D., M.P.H., a regional mental health consultant of the Public Health Service, stated in a discussion of remedial and preventive services in mental health in the school program.

Dr. Jacobs quoted from a study made by the Committee on Mental Health of the College Health Conference which found that "about 15 percent of all college students could be expected to benefit from mental health services. Of these, 5 percent would be considered urgent cases.

In some colleges and universities psychiatric and student counseling services are available as part of the educational system, Dr. Jacobs reported. Teacher training institutions in general, he believes, could make good use of remedial services for the persons who will become classroom influences on the emotional health of their charges.

Clinical services should also be available to the 10 percent in the elementary and high schools who need professional help, Dr. Jacobs said. Community-wide use of these services is indicated, he said, whether the clinic is part of the school system, the local health department, or another community agency.

Stresses Teacher Training

In speaking of preventive services, Dr. Jacobs stressed the importance of the teacher in the training of emotionally sound individuals. It is her understanding of children and her own maturity that determines the kind of job she will do in bringing out the best in her pupils, he said.

Much is now being done to give the teacher the information and practice she needs in understanding mental health concepts in the classroom, he said. For graduate teachers, a number of schools have in-service

training programs, institutes, and workshops where thousands of teachers have received instruction from psychiatrists, psychologists, and social workers. In teacher training colleges, the student health and counseling services are a valuable source of health education, he stated.

Dr. Jacobs recommended that physicians and nurses in the school health program receive similar indoctrination in the mental health field.

In addition to trained teachers and personnel, a school health program needs material with which to work, Dr. Jacobs stated. The workers need the preschool history of the child as well as cumulative records during his school years. They need complete examinations of the children, including an expert appraisal of their personalities.

By working for good facilities and services in every phase of health, by taking advantage of every educational opportunity, and by allaying fears and anxieties in their charges, health workers could make the schools a worthy second to the home in helping develop mature personalities, Dr. Jacobs concluded.

School Dental Programs Influenced by Research

Research in the field of dental caries prevention has been one of the factors significantly affecting school dental health programs, according to a survey of trends presented by Lester A. Gerlach, D.D.S., dental director, Milwaukee Health Department.

Dr. Gerlach noted that research in caries prevention has proceeded along two avenues of approach: the use of fluorides on the surface of the tooth, and the use of agents, such as ammonia, vitamin K, and others, to control the tooth's environment.

School dental health programs, he indicated, are aimed primarily at the prevention of dental caries through

the use of these newer techniques supplemented by a good educational program. "Both the fluoride water therapy and the topical application of sodium fluoride are becoming more of a reality all the time," he stated. "Although good, the fluoridation method of preventing dental caries is not a cure-all and must be augmented with a good dental health educational program."

The trend is toward streamlining the program and limiting the use of trained personnel as much as possible, he declared. The shortage of dentists and dental hygienists has made mandatory the use of allied workers and auxiliary personnel whenever feasible. He suggested that health educators, the school medical and nursing staff, and teachers can disseminate dental information.

A paramount consideration in future school dental health programs, he stated, will probably be the education of parents regarding the known caries preventives—their benefits and their limitations—and the encouragement of better dental hygiene in the home. There also exists a great need for attention to phases of dental health other than caries—malformations, malformations, crooked teeth, periodontal disturbances, infections, and oral manifestations of general systemic conditions, he concluded.

Study of School "Programs" Indicates Needed Revision

Ten suggestions for improving school health instruction programs were offered by Dora A. Hicks, M.A., chairman of professional health education, University of Florida.

From a review of the literature on current theories of health education and from a study of present practices in city schools as determined from replies to questionnaires, Mrs. Hicks concluded that attention should be directed toward the following measures:

Inform teachers, health personnel, and the general public of newer concepts in health instruction; improve school environments; conduct and promote original, organized health research among students, teachers, and community groups; establish college graduation requirements in basic health and hygiene for all students; include instruction in health education in certification requirements for teachers.

Also, provide regular school time for health planning and instruction; establish functional health committees in every school; evaluate and revise the health curriculum regularly; develop comprehensive State health teaching guides with suggestions for local use; and develop local health teaching guides that provide for articulation and continuity of health instruction.

Present Practices

Current methods used in developing health programs for grades 1-12 were investigated by sending questionnaires to the directors of curriculum construction in 75 large city schools, Miss Hicks reported. Replies, received from 39 schools, indicated how health needs were determined and how problem areas were selected, and listed the most neglected areas of health instruction and topics which should be included in a modern health education curriculum.

Briefly, the study revealed that:

Twenty-eight percent of the cities consider the use of State guides the best procedure for selecting problem areas, but 38 percent use a State outline or course modified to fit local conditions. Sixty-two percent of the cities indicated that it is best to use State guides as a resource only.

Sixty-two percent reported that it is not practical for individual teachers to determine the scope of health instruction because they are not qualified and because continuity cannot be accomplished by this procedure. The 38 percent in which individual teachers determine the scope pointed out that they should

work on various committees, with guidance, and should select units only within a basic framework.

Ninety-three percent indicated that their health instruction programs provide for articulation and continuity of instruction from grade to grade without unnecessary duplications or undesirable gaps.

Forty-five percent of the cities indicated that mental and emotional health was the most neglected area in their programs, and 21 percent reported insufficient emphasis given to sex education and to personal health.

Twenty-five percent of the cities listed as necessary topics for instruction: personal hygiene, mental health, sex education, nutrition, infection and disease, and body structure and function.

Urges Flexible Planning In Health Teaching

The need in grades 1-12 for health instruction on an equal basis with other important instruction was emphasized by J. Keogh Rash, Ph.D., chairman of the department of health and safety in Indiana University's School of Health, Physical Education, and Recreation.

Discussing the scheduling and se-

quence of health education in the school system, Dr. Rash said that proponents of the "continuous emphasis" plan reason that since the establishing of desirable habits is one of the major objectives of health education and can only result from repeated exercise, it follows that continuous emphasis must be placed on those habits which are to be encouraged.

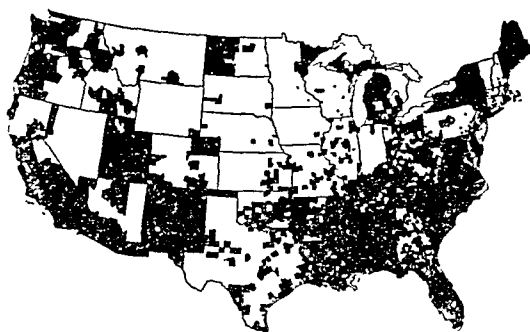
Supporters of the "opportunistic" plan propose using a psychological approach to health instruction, he said, explaining that a particular health problem is emphasized whenever the ideal opportunity for successful teaching offers itself.

Followers of the "cycle" plan seek to reinforce previous learning of special health problems by singling out a special health problem every few years for intensive study because of the growing child's changing needs, interests, and abilities.

In Practice

Each plan has its individual disadvantages, Dr. Rash said. The continuous emphasis plan is probably the oldest and most widely used; and the opportunistic plan has widest application in the kindergarten and first grade.

The cycle plan first appeared in the 1933 Indiana State course of study for elementary schools. Its first state-wide application was to all



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full-time local health services

1920—138 counties
1952—1,637 counties

grades in Oregon during 1945-46, he said. In 1948, Virginia adopted some of its principles. He continued:

"The new course of study in health education for Indiana, now in the try-out stage, suggests a combination of the cycle plan and the continuous emphasis plan. In certain problem areas, notably personal hygiene, the cycle plan is suggested while in other areas, notably nutrition, the continuous emphasis plan is suggested. The State law in Indiana requires instruction concerning the effects of alcohol and tobacco in grades 4 to 8, inclusive, so that the continuous emphasis plan will, of necessity, operate in this area during those years."

"The particular plan is not important," he concluded. "What is important is that there be conscious planning at the local level on the basis of the criteria of need, interest, comprehension ability, and ability to do for one's self. There must be sufficient flexibility to allow for continuous emphasis when necessary, and for use of the psychological approach when it seems desirable. In reality, the solution to the problem of scheduling and sequence rests not so much in a particular plan as it does with the planners."

School Health Activities In Cleveland Reported

The program of school health services offered in the Cleveland public schools was reported to the American School Health Association by Charles F. Good, M.D., director of school health services of Cleveland's board of education.

Emphasis is placed on prevention and early detection of deviations from good health, said Dr. Good. He felt that the primary responsibility for children's health is with the parents and that the basic role of school health programs is to assist medical and dental services already existing in the community.

Cleveland's school health budget has varied according to school enrollment, he continued, but it has gradually grown during the years.

In 1952 the over-all costs of school health services in Cleveland were \$3.80 per pupil, and costs of supplies averaged 4½ cents per pupil. However, these figures do not include special items of equipment which are acquired or replaced at times, even though the health service budget is part of the educational budget of the school system.

Health examinations of pupils—especially preschool examinations—have been stressed in Cleveland, said Dr. Good. He felt that such examinations are educational experiences, for parents may get advice on their children's needs from the school physician and nurse and then seek help from the family physician, dentist, or other community medical resources.

Follow-Up Stressed

But physical examination without adequate follow-up in each case of discovered disorder is fruitless, he continued, and in the Cleveland program the school nurse has the primary follow-up responsibility. She maintains a "work book" in addition to a permanent, accumulative pupil's health record card, and stresses the desirability of parental consultation with herself, a family physician, a teacher or principal, or appropriate clinics or specialists.

Besides general and special health examinations and the follow-up system, the Cleveland program provides also: eye and ear clinics for selected pupils; tuberculosis prevention and detection activities; dental examinations and mouth hygiene instruction; and psychiatric consultation for referred pupils.

The 24 part-time school physicians in Cleveland are assigned to one or more schools each morning during a week. When smaller schools are assigned to a physician he may divide his time among them or visit them on alternate weeks. Each physician has about 5,500 pupils in his weekly school assignment.

Nurses' assignments include a number of schools in adjoining neighborhoods with enrollments of about 2,200 children. Schedules are ar-

ranged to coincide with physicians' schedules. Time is allotted to each school so that schools of 500-600 enrollment have about 3 half-days of nurses' time each week and larger schools have more time proportionally.

At the present time, continued Dr. Good, the Cleveland school health program has no orthopedic diagnostic service. Most orthopedically handicapped children are now referred to and accepted at the Sunbeam School for Crippled Children when unable to attend regular school. This school, he added, has an enrollment of about 140 children and serves the entire county. Besides the school nurse and physician, the school has four physiotherapists, a speech teacher, and numerous attendants, thereby stressing not only educational progress but also the adjustment of the handicapped child to adult responsibilities.

Field of School Nursing Is Reported Growing

The steady increase in the number of school nurses employed by boards of education—from 3,477 in 1937 to 6,088 in 1951—indicates that school nursing is becoming a specialized field of public health, averred Emily S. Brown, R.N., head nurse of the Elizabeth, N. J., board of education.

Other trends noted by Miss Brown were better preparation of school nurses, a closer alliance of the nurses with educational and school organizations, and an increasing drive toward organization themselves.

She felt that administration of school health services by boards of education is particularly desirable in large or moderate-size city schools. "School nursing cannot be conducted adequately unless the nurse's time is devoted entirely to the school," she declared.

In progressive school systems the school nurse is a health counselor, educator, and consultant—an important contributor to the child's educational experience, she continued. This, in turn, has drawn the

nurse into educational organizations to share in the over-all plans and objectives of the teaching profession.

Deploring the disparagement of specialized school nursing, Miss Brown declared that school nurses are not responsible for the alleged overlapping of public health nursing activities. They do not live in an "ivory tower," unaware of the needs and lives of the families of the children they care for, she said.

School nurses are not always able to satisfy their needs in regular public health nursing programs, she said. Many have to meet health teaching requirements and prefer to take work in health education, thereby having to sacrifice some areas of recognized public health nursing curriculums. She felt that school nurses should be accredited for study programs in health education as well as in public health nursing.

Miss Brown concluded that strong organization is needed among school nurses to better interpret their work to other public health groups and thus achieve greater recognized status.

School Health Education Viewed as Specialty

Teachers of English, history, music, or any other specialty are pinch-hitting as health instructors in our schools, according to Jennelle V. Moorhead, M.S., associate professor of health education, University of Oregon.

Lack of certification requirements for school health teachers allows school administrators to assign health courses to any teacher with a free period, she asserted.

In a study of the transcripts of 307 health teachers from 83 percent of the Oregon high schools, Miss Moorhead found majors in 31 different fields. Only 37 percent had majors in physical education, home economics, or biology, three of the fields recommended by national committees as suitable background for health teaching.

The newness of school health edu-

cation as a specialty has contributed to the lack of properly prepared health teachers, Miss Moorhead indicated. It has developed as a field separate from physical education since the late 1930's. Young people, who seldom see a health specialist at work, do not think of health education as a career, she said. Even vocational counselors in high schools and colleges may not regard it as a field of specialization.

Few institutions of higher education offer a bachelor's degree with a major in health education—only 41 of the 1,688 institutions surveyed by the Office of Education in 1949, Miss Moorhead continued.

Although schools generally agree on the basic subject matter of the courses offered, they differ on course scope and content and on the number of credits needed to insure competence as a specialist, she said.

534 Health Topics

As an indication of what the health teacher should know, Miss Moorhead cited an analysis of the Oregon course of study for health. This showed that the Oregon high school health teacher is expected to teach 534 separate health topics in the nine major health units—personal hygiene, community health and sanitation, communicable disease, nutrition, mental health, first aid and safety education, choice and use of health services and health products,

physiology of exercise, and structure and functions of the human body.

Sixteen training courses, Miss Moorhead found, were important in determining how well prepared the teachers were for health instruction. She recommended that other States make a similar job analysis for their health teachers.

After training the health education major, we must also place him, Miss Moorhead stated. School administrators have stressed the importance of health subjects, but in actual practice they do not designate a place on their staffs for a health specialist, she declared, explaining that the situation is further complicated when people in the field of health education recommend the integration of health education into other areas in the high school curriculum.

To obtain for health education its proper status in the schools, health educators must first agree on a course of study for training health teachers, Miss Moorhead concluded. They must offer concrete suggestions on what is to be taught in various grades and how it is to be taught. They must sell school administrators on the importance of health education. And they must get young people interested in school health education as a profession through work with parent groups and with high school and college guidance personnel.



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Maternal and Infant Mortality Surveys and Evaluations

As a factor influencing maternal and infant mortality, anesthesia was mentioned frequently in the sessions of the maternal and child health section. This factor appeared of significance in a study of the premature born in a Kansas hospital and in one reporting the results of a Minnesota survey. In another presentation before the section, a report was made on the quantitative adequacy of prenatal care in a middle-sized community.

Probe of Specific Factors In Infant Death Advised

Research on the causes of infant mortality should henceforth be concentrated on hygienic practices, "mothercraft," and similar factors within given income and occupational groups, Odin W. Anderson, Ph.D., associate professor in charge of the social aspects of medicine, University of Western Ontario, Canada, believes.

Dr. Anderson indicated that further research on the general relationships between infant mortality and income level, class, and occupation would be a waste of time, money, and effort. The general social factors affecting infant mortality have been conclusively established, he said. A synthesis of the profuse data on infant mortality during the past 100 years, and in more detail the past 50 years, shows clearly that a high infant mortality rate is associated with poverty.

Enlarging on known facts, Dr. Anderson stated that mortality rates begin to drop perceptibly in many

countries at a certain stage of their technical development. In fact, it would seem reasonable to assume that when the infant mortality rate in any area falls below 30 per 1,000 live births, he said, the economic factor becomes less and less operative as a general cause of mortality, and other factors, such as mothercraft, intelligence, personality, and specific hygienic practices, become more operative.

Dr. Anderson suggested that any further search efforts be directed at this complex of factors within specific groups.

Feeling of Personal Worth Basic in Prenatal Care

A sense of personal dignity and worth that prompts women to seek care early in pregnancy is a prerequisite to an effective prenatal care program, a study sponsored by the Rochester Health Bureau and the University of Rochester School of Medicine and Dentistry, New York, found.

Making the study of the quantitative adequacy of prenatal care in the medium-sized urban community of Rochester were Alfred Yankauer, M.D., M.P.H., director of maternal and child health services, New York State Department of Health, and Kenneth G. Goss, M.D., and Salvatore M. Romeo, A.B., public health interns of the department.

Most of the women, regardless of economic status, sought early aid, but a small number of women of low socioeconomic status neglected to seek care until late in pregnancy, the investigators reported.

Socially Disorganized

A study of a group of socially and economically underprivileged women

who failed to get early prenatal care revealed a greater degree of social disorganization in comparison to a group of similar status who sought care. In the study group there were more out-of-wedlock births, greater mobility and fertility, and a greater degree of welfare dependency. The incidence of birth weights of less than 2,500 grams and of neonatal deaths was significantly higher in this group.

The investigators concluded that the women with adequate care were able to translate their feelings of personal worth into sound health practices and bear healthy children. Failure to seek prenatal care, they termed an outward manifestation of the rejection of pregnancy and the loss of a sense of personal dignity. These attitudes affect the fetus adversely by way of maternal nutrition and pattern of living, they stated.

Helping these women attain a sense of dignity and worth is a task confronting the community as well as the public health and social worker before prenatal care techniques and knowledge can be effective, they said.

Minnesota Survey Reveals Lower Maternal Mortality

The reduction in the maternal mortality rate in Minnesota from 2 in 1941 to 0.3 per 1,000 live births in 1951, although a great improvement, is not the maximum possible, according to A. B. Rosenfield, M.D., M.P.H., director of the division of maternal and child health, Minnesota Department of Health.

In many States maternal mortality rates are now lower than was thought possible 10 years ago, but surveys show many maternal deaths could be prevented, he said.

The Minnesota survey of 1941-42 was resumed in 1950 and is now in its third year. Eight physicians selected by the maternal health committee of the State medical association

tion in addition to Dr. Rosenfield are on the committee conducting the survey.

The survey includes in its coverage all women who die during pregnancy or within 3 months postpartum, regardless of the actual cause of death. A State health department regulation helps the committee get prompt notification of maternal deaths. An obstetrician investigator visits the hospitals and reviews charts, nurses' notes, anesthesia records, and pathologists' reports. The investigator also interviews hospital personnel, visits the attending physician and obtains the history, including prenatal care. He interviews the consultant, if there was one, and relates if data is needed from them.

The committee reviews the investigator's report, and its determination of cause of death is mailed to the attending physician and to the consultant.

The 1950 survey showed (in comparison with the 1941 survey) a 40-percent increase in the number of live births, a 35-percent increase in the number of hospital births, and an accompanying decrease of 70 percent in maternal mortality. Marked improvement was noted in prenatal, delivery, and postpartum care although some deaths were still attributable to faulty care.

Dr. Rosenfield asserted that anesthesia is becoming a more important factor in maternal mortality. In 1941, he said, anesthesia was responsible for three deaths (3.2 percent) but accounted for four deaths (8.7 percent) in 1950. However, anesthesia contributed to 12 additional deaths.

Other significant survey facts were: Consultations increased from 44 percent in 1941, with 9 percent considered adequate, to 57 percent in 1950, with 32 percent considered adequate. Over half the deaths in both years occurred in women who had operative deliveries. In 1941 three-fourths of the maternal deaths were considered preventable; in 1950 only one-third were considered so, he said.

Use of Analgesia Opposed In Premature Labor

"The use of analgesia in known premature labor deserves nothing but condemnation," declared Russell A. Nelson, M.D., of the Wichita Foundation of Medical Research, and Francis E. Barry, M.D., Maj., U. S. Air Force, Lackland Air Force Base, San Antonio.

They stressed that drug depression by any analgesics, hypnotics, sedatives, or anesthetics may cause anoxia of the premature and that medication effects are more profound in the fetus than in the mother. If general anesthetics must be used, they recommended nitrous oxide and oxygen, no stronger than 80 percent nitrous oxide.

The physicians felt that painless labor produces threats to the infant and should not be offered. Short labors with some relief will give infants in better condition, they said.

Their conclusions were based on a study of all liveborn infants from 500 to 2,500 gm. born in 1949 and 1950 at St. Francis Hospital, Wichita, Kans. The hospital's incidence of premature births is about 7 percent, with a death rate for this group of 21.8 percent.

Regarding the use of analgesia and its effect on 246 perineally delivered prematures studied, they reported

that no infant under 1,000 gm. receiving analgesia survived while 50 percent of those receiving no analgesia did survive. From 1,000 to 1,500 gm., 75 percent of the infants without analgesia survived, compared with 56.3 percent of those having it. All in the 1,500 to 2,500 gm. group receiving no analgesia survived. Of those having analgesia, the death rate was 20.9 percent for the 1,500-2,000 group and 9.5 percent for the 2,000-2,500 group.

Warn Public

Public health programs should warn the public of the danger of heavy sedation and general anesthetic for delivery of the average baby, they said. They advocated more attention in medical schools to premature labor and immediate care of premature infants.

Most anoxic and atelectatic infants die in 24 hours, they continued. They felt that both the general practitioner and the specialist should be adept at resuscitation, including tracheal intubation and aspiration. When infants are delivered in poor condition, oxygen and an airway are of primary importance, they emphasized.

The doctors felt that death conferences should be held in all hospital obstetrical departments, just as surgical material is examined for pathology.



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Water Fluoridation Programs And Community Health

The water fluoridation program and community health were discussed at a joint session of the APHA sections on dental health, public health education, and public health nursing with the American School Health Association and the Conference for Health Council Work. Topics included an appraisal of the water-borne fluoride-to-dental caries relationship, toxicological evidence of safety in the use of fluorine techniques and a statement on the public health nurse's role.

In another session, the engineers looked at fluoridation in terms of benefits, safety, and current practices. In still another session public health dentists discussed the prefluoridation base-line survey and also considered the effect of topically applied stannous fluoride on caries experience.

Research on Fluorides A Continuing Project

Continued and even expanded research on the relation of fluorides to dental health was recommended by H. Trendley Dean, D.D.S., director of the National Institute of Dental Research, Public Health Service.

Although fluoridation of public water supplies for the partial control of dental caries is an accepted public health procedure, a public health problem can never be considered closed, Dr. Dean asserted.

In presenting the current status of fluoridation, Dr. Dean said that nearly 8½ million residents of 427

communities, distributed among 42 States and the District of Columbia, were using fluoridated water supplies by September 15, 1952. This preventive measure had been approved and plans were under way to start the program in an additional 299 communities with more than 15 million residents, he said.

Dr. Dean noted that extensive research has accompanied the program. The inquiry into the effect of fluorides on dental caries expanded into many areas heretofore thought far removed from dental hygiene, he said. He named as among the specialized fields profitably used in the systematic development of the study: basic research in analytical water chemistry, physiology and biochemistry, biometry, pharmacology, histology and pathology, microbiology, dentistry, medicine, public health, sanitary engineering, and water works operation. Explored to a lesser extent but nonetheless important, he said, were geology, hydrology, climatology, veterinary medicine, physical chemistry, and biophysics (radioactive isotopes, electron microscopy, and electron diffraction).

Further research can perhaps improve the effectiveness of fluorides, Dr. Dean concluded, and there remains further exploration of the response of a mass population to a changed physiological environment.

Nurses Have Teaching Role In Community Fluoridation

The public health nurse has a major educational role in a community water fluoridation program because of her direct relationship with the individual, the family, and the community as a whole, said Esther A. Schisa, R.N., B.S., public health

nursing director of the Ulster County Health Department, Kingston, N. Y.

The addition of the water fluoridation program to public health dentistry merely necessitates equipping each nurse with knowledge of the relationship of fluorides to dental caries, she continued. The nurse, who more than most directly interprets a health department program, must then not only emphasize the importance of good nutrition, cleanliness, supervision by a dentist, and other aspects of dental health, but also must understand the techniques of water fluoridation, the community need for the program, its costs, practical aspects and effectiveness, and methods of control.

Miss Schisa emphasized that the public health nurse should maintain an objective viewpoint toward water fluoridation regardless of her personal sentiments and beliefs.

Toxicology Tests Show Fluorides to Be Safe

Replying to critics of fluoridation, Francis F. Heyroth, M.D., assistant director of the Kettering Laboratory, University of Cincinnati College of Medicine, said that toxicological evidence assures the public that it can safely drink from communal water supplies containing optimal fluoride concentrations.

Unless public health authorities inform the public of the evidence upon which they base their beliefs in the safety of fluoridation, many will accept statements that little is known of the toxicity of fluorides or that the epidemiological evidence relied upon by fluoridation advocates fails to reveal adequately any adverse effects that may be associated with individual variations in susceptibility, Dr. Heyroth stated.

He outlined in some detail the extensive toxicological evidence now available and paid particular attention to acute and chronic toxicity, histological and histopathological changes in animal experimentation.

industrial human fluorosis as well as the experiments with human cases.

He pointed out that animal experimentation shows that the prolonged intake of quantities of fluoride too small to induce dental fluorosis does not give rise to any of the nondental manifestations of chronic intoxication by fluorides. Epidemiological data and clinical and radiographic examinations of exposed industrial workers indicate that only when the fluoride content of a water supply exceeds 5 or 6 ppm will its prolonged usage give rise to detectable osseous changes, and then only in the most susceptible persons, the laboratory director reported.

Toxicological Experiments

There need be no fear of acute poisoning as a result of the accidental or deliberate overfluoridation of a water supply, Dr. Heyroth emphasized. The only toxic hazard to be associated with fluoridation would be that of the cumulative action of small amounts taken daily over a long period, he asserted. The lethal dose in rabbits is 50 to 200 mg. of fluoride ion per kilogram of body weight. In human self-experimentation, as much as 250 mg. of sodium fluoride has been taken at one time without harm, he stated.

"It may be concluded from the results of animal experimentation that interference with growth cannot be induced by a daily intake too small to give rise to dental abnormalities and that only after the bones have stored considerable quantities of fluoride does any impairment of skeletal function occur," he said.

For the past 12 years, the Kettering Laboratory has conducted painstaking investigations to learn the rates at which storage in human bones occurs when known amounts of fluorides are ingested daily. By analyzing duplicate amounts of all food and liquids ingested daily by selected subjects over prolonged periods, the average daily intake of fluoride of each subject was measured. Two were found to have in-

gested 0.49 and 0.72 mg. of fluoride per day, and appeared to be in metabolic balance with respect to fluoride. One of the two ingested 6 mg. of extradietary fluoride (sodium salt) per day over a period, and retained the equivalent to 0.095 mg. per kilogram of body weight. Over a long period, two others took daily doses of sodium salt, equivalent to 0.05 and 0.14 mg. per kilogram respectively. In neither subject have radiographic changes occurred in the density of the bones, although one took more than 20 gm. of sodium fluoride during a period of 120 weeks.

Dr. Heyroth referred to the brief balance experiments, in which an attempt was made to measure elimination through the skin, and the conclusion that when daily intake did not exceed 4 or 5 mg. the major portion was eliminated from the body.


Panel Summarizes Data On Water Fluoridation

Introducing a panel discussion on fluoridation, Charles R. Cox noted that its purpose was the summarization of accumulated data on the subject. Mr. Cox is chief of the water supply section, bureau of environmental sanitation, New York State Department of Health.

The public health administrator is confronted with the need for answering the medical, dental, and toxicological arguments against fluoridation which have been brought forth by some groups and individuals, and the public health engineer and the water works official have the problem of establishing satisfactory procedures and controls for the fluoridation of potable water supplies, Mr. Cox pointed out.



He assigned the problem of appraising the medical, dental, and toxicological data to the specialists in these fields. A recent statement by the board of directors of the American Water Works Association, reaffirming and augmenting their policy announced in 1949, clearly supports the attitude that the fluoridation of public water supplies represents a dental health program, the basic policy for which rests with medical and dental health directors, he said. It is significant, he observed, that the fluoridation of public water supplies is supported by the following associations of responsible public health administrators: State and Territorial Health Officers Association, State and Territorial Dental Directors Association, American Association of Public Health Dentists, and the Conference of State Sanitary Engineers.

Mr. Cox also pointed out that the technical data resulting from re-



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search and experience have led the following national technical associations to support the fluoridation of public water supplies: American Public Health Association, American Medical Association, American Dental Association, and National Research Council. Clearly, he said, these organizations did not give their support lightly but only after careful study.

Taking part in the panel were David B. Ast, D.D.S., director of the bureau of dental health, New York State Department of Health; Julius S. Cass, D.V.M., Kettering Laboratory, University of Cincinnati College of Medicine; John M. Hepler, C.E., director of the division of engineering, Michigan State Department of Health; and Norman E. Jackson, whose presentation is reported below.

Nation's Capital Begins Fluoridation of Water

Fluoridation of the Washington, D. C., water supply in the amount of 1 ppm began in June 1952 with the opening of the Dalecarlia filter plant, reported Norman E. Jackson, M.S., chief of the Washington Aqueduct's Dalecarlia section in the Washington district of the U. S. Army Corps of Engineers.

Mr. Jackson traced the development of the fluoridation program from its origin in the District Department of Health's bureau of dental services through its consideration by District departmental, public and governing authorities to its review by Congress and final enactment into law. He then made the following observations from experience at the Dalecarlia plant:

Large installations should order sodium silicofluoride (the fluoride agent used in Washington) in carload shipments of large drums rather than paper bags, because of the quantity necessary and the toxic dust hazard in bag breakage. Vacuum pneumatic handling of the agent with properly designed, in-

stalled, and maintained equipment practically eliminates the dust hazard, but protective personnel equipment and clothing also should be used as a safety precaution.

The tendency of sodium silicofluoride to conglomerate into lumps during storage can be partially reduced by filling the storage bins to only 10 percent of capacity, thus reducing weight and detention period. This procedure, however, does not solve the problem of large tonnage storage. Should bins or hoppers with sloping bottoms be used, the minimum angle should be 60 degrees with the horizontal. A more desirable installation and a better gravity flow will be achieved if bins and hoppers have one vertical side.

Screening Urged

Before being introduced to filtered water, the fluoride solution should be adequately screened for foreign matter. In the installation of piping, hard rubber pipe is recommended for rigidity needs and polythene-base plastic pipe for flexibility and non-corrosive qualities.

Although not proved conclusively, alum flocculation seems to adsorb the fluoride. With medium dosage of 1.1 gr./gal. the adsorption loss is only 5 percent, but with high alum dosage of 2.5 gr./gal. the loss may reach 30 percent. Adsorption loss in reservoirs and distribution is inconsequential.

The chance of overdosage of fluorides is negligible, provided there is proper equipment and alert and competent supervision.

Conduct Base-Line Survey Before Planning Program

"The promotion, institution, and evaluation of fluoridation are presenting unique opportunities for a fresh approach to the establishment of community dental programs and enhancing their likelihood of success," said Norman F. Gerrie, D.D.S., M.P.H., Public Health Service, Denver, Colo.

In discussing the planning of community dental programs, Dr. Gerrie emphasized that the prefluoridation base-line survey gives the community its best means of obtaining authoritative information on its current dental health status. No dependable plan for a dental health program can be constructed without such facts, he said.

He pointed out that the inclusion of the local dentist in the base-line survey will help the dentist to see first-hand the status of his community's dental health and to understand better the statistical and public health significance of the data. It will also enable him to participate more actively and authoritatively in the planning of a program to fit the needs of the community and to recommend program content consistent with his inclinations and abilities and the community resources. The public health dentist should act as consultant and catalyst in such surveys, Dr. Gerrie added.

Outlines Steps to Program

In forming a community dental program with both short- and long-range objectives, the following steps were recommended:

1. Securing base-line dental caries data by a community survey. If there are no local practicing dentists to make the survey examinations, the services of a public health dentist or private dentists from nearby communities should be used.
2. The data should be processed, analyzed, and interpreted by the public health dentist in detailed reports to the local dentists and to a local committee of responsible citizens. The data should be easily comprehensible and accompanied by charts, graphs, and recommendations.
3. At subsequent meetings of the committee, which should include dental representation, a program should be formulated with objectives and methods chosen according to the extent of the problem, the desires of the groups and individuals involved, and the resources of the community.

4. A critical, periodic evaluation of the program to measure progress toward objectives.

Stannous Fluoride Reduces Tooth Decay in Children

A 56-percent reduction in the number of newly decayed teeth was noted in children whose teeth had been treated topically with stannous fluoride, compared to a control group of children who had received a dental examination only, reported Charles L. Howell, D.D.S., M.P.H., Charles W. Gish, D.D.S., and Roy D. Smiley, D.D.S., assistant director, dental consultant, and director, respectively, of the division of dental health, Indiana State Board of Health.

Four groups of children in Bloomington, Ind., were studied in 1951 to determine the effectiveness of stannous fluoride in preventing tooth decay in the permanent teeth of young children, the dentists said. The first group of 210 was treated with sodium fluoride; the second group (382) was treated by use of the same technique with stannous fluoride; the third group (409) was treated with stannous fluoride using a different method mainly keeping the tooth surfaces moist during treatment; and a fourth served as a control group. Both stannous fluoride groups had a higher ratio of teeth recorded as carious in 1951 and noncarious in 1952 than either the sodium fluoride or the control group.

Compared to the control group, the reduction in number of newly decayed teeth after 1 year was 54.8 percent for the first group, 56.4 for the second, 53.6 for the third, according to the report.

Keeping the surfaces of the teeth moist throughout the treatment period did not increase the caries-reducing potential of stannous fluoride under the conditions of this study, they stated.

Dr. Howell and his colleagues

recommend assignment of children to treatment groups by age and previous dental caries experience rather than by random distribution of numbers, which they said resulted in groups unequal in age and in numbers of decayed, missing, and filled teeth.

No Evidence of Pathoses From Fluoride Ingestion

"Objections to fluoride ingestion from water supplies as productive of various pathoses have had no support beyond vague 'might be' or 'could be' or 'we don't know' expressions," declared Frederick S. McKay, D.D.S., Sc.D., of Colorado Springs, who first traced "mottled enamel" to heavily fluoridated natural water supplies.

"The best informed scientific opinion available is emphatic in declaring that there is no submitted evidence of any pathoses associated with such fluoride ingestion," he continued in his discussion of the relationship of water-borne fluorides to dental caries.


Fluoridation is a natural phenomenon and not an experiment, he asserted, and recalled that its discovery came in a study to find the cause of "mottled enamel." The low amount of caries that went with

mottled enamel was not recognized for many years.

Dr. McKay pointed out that 23 States have naturally fluoridated water supplies, some with as much as 3 ppm and more as against the recommended 1 ppm, and no evidence of damage to the inhabitants has been uncovered. He noted that such places would be ideal for finding evidence of illness caused by fluoridated water.


Fluorosis, even to an extremely disfiguring degree, can be produced when the fluoride content is 2 ppm or more, but the caries experience rate may be and often is low. However, there are persons who use water with 2 ppm of fluoride and higher with no visible fluorosis and a low caries experience rate. Although there is no explanation for this, it is of extreme importance, he stated, that this "not visible" fluorosis has a caries resistance equal to that of visible fluorosis.

Dr. McKay credited the Public Health Service studies with establishing the relation between fluoridated water and the dental caries rate. When the fluoridation of our water supply becomes general throughout the country, he said, the dental profession will be within "striking distance toward control of the damage to and loss of the teeth by caries."



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**control
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Field Research and Appraisal In Health Education

Planned, organized, objective investigations of the "why" of health education are becoming more frequent, reports to the APHA of going projects revealed. In a symposium on "current research affecting public health education" as well as in other sessions, some dozen presentations were made. Those for which texts were available are summarized here

Use of Behavior Knowledge Underlies Program Success

There is no better place than the field of public health to put to use available knowledge on why people behave as they do, in the opinion of Nancy Starbuck, Ph.D., education psychologist in the Division of Dental Public Health, Public Health Service.

Three principles of human behavior which seemed applicable to the problem of community organization were tested in six communities previously visited by a topical fluoride demonstration team. Dr. Starbuck stated that three communities had established continuing programs after the teams had left; three had not. The research problem was to find out why some community leaders set up continuing programs and others do not, she reported.

To reach a decision to initiate and carry out a program, Dr. Starbuck said, community leaders must regard it as a means of solving a problem and an aid to accomplishing their own objectives, as well as feeling that they have initiated the program and that others in the community want it. Community leaders and program administrators must agree

on its purpose, and objectives, and accept the methods employed, she stated.

How Principles Operate

In the communities which continued the programs, the leaders saw a direct relationship between their own objectives and those of the program, and reported that the demonstration team had been invited by the local people or through local and State officials, she said. Community groups had been solidly behind the leaders both in requesting the team to come in and in continuing the program after its departure. Most community leaders realized the long-range purpose of the program and had discussed continuing it after the team left. "Logical" groups—dentists and physicians, city and school officials—predominated in the planning.

In the three communities which did not continue the program, Dr. Starbuck said that local people had had no part in the decision to invite the demonstration team; they did not support the leaders; they had no appreciation of the long-range objectives of the program; the planning group was composed largely of civic groups, PTA's and fraternal organizations; and the leaders did not like the methods used.

Michigan Tests Response To Survey Publicity

Janitors and caretakers in semi-slum areas may play an important role in getting their tenants—especially the foreign-born tenants—to have their first chest X-rays.

This case-finding clue was reported by Norbert Reinstein, M.P.H., director of the Tuberculosis and Health

Society of Detroit during a study of factors which influence people to have X-rays. Using health department sanitarians as emissaries, an educational program was launched to enlist the support of janitors and caretakers in the next X-ray campaign. Result: In an area where only 110 foreign-born persons had been X-rayed in previous years, 553 turned out for X-rays after the new approach was tried.

The media for the X-ray educational programs in Wayne County are the local newspapers, leaflets, churches, schools, and home visits, Mr. Reinstein stated. The results of these phases of the program were studied when community attendance to the X-ray mobile truck decreased.

Former Campaigns Studied

Campaigns in 1949 and 1950 in Hamtramck, Highland Park, and Dearborn were evaluated. Graduate students of the University of Michigan Institute of Social Work volunteered to conduct the study. It was found that in all communities the newspapers were the most frequently mentioned source of information, Mr. Reinstein reported. The most effective personal sources of information were the churches in Hamtramck; the schools in Highland Park; and home visits in Dearborn. The only general conclusion was that the campaigns had influ-

Valuable clues in the quest for chest X-ray, Mr. Reinstein said.

Valuable clues in the quest for improving the X-ray publicity in Wayne County were shown to be:

1. A group of 110 foreign-born persons came for their first chest X-ray through direction of janitors of the rooming houses in which they lived. Health department sanitarians inspect the houses regularly and the janitors and caretakers seem to be influential with the foreign-born residents. At the same location during the next survey, 553 of these persons came for X-rays.
2. Persons had stayed away from being examined though they had

been reached. It was found that untrained volunteer workers failed to motivate them.

3. Distribution of leaflets by Boy Scouts was not as effective in one community as home calls by adults which in another locality brought twice as many persons to the trailer.

4. The site chosen for the X-ray trailer was very important.

5. Enlistment of the private medical practitioner and the community dentist is valuable and often the means of local success.

A Pre-evaluation of Pierre the Pelican

Accepting Knutson's principle that evaluation should precede wide distribution of any education material and that a field test constitutes a final criterion in the process of evaluation, Bernard G. Greenberg, M.D., and his associates attempted to find what impact a certain mental hygiene pamphlet would make upon parents of first-born children in North Carolina.

Pamphlets Distributed

The series of pamphlets "Pierre the Pelican" prepared by Loyd W. Rowland for the Louisiana Society for Mental Health was widely distributed throughout Louisiana in 1947. Designed to cover good principles of child rearing beyond the area of physical care, they are, according to the author's statement, characterized by simplicity, cast at the sixth-grade reading level, illustrated by sketches, and comprised of a series of 12 pamphlets, one to be sent out each month. The series attempts to cover topics of interest to young parents, is of optimal length, and makes use of questions for teaching purposes.

The North Carolina State Board of Health, before embarking upon a permanent program of distribution, asked Dr. Greenberg, C. Frances MacKinnon, M.S., and Sidney S. Chipman, M.D., all members of the

faculty of the University of North Carolina School of Public Health, and Mary Ellen Harris, M.S., of the Institute of Statistics at Raleigh, to make a study of the pamphlet's effectiveness.

The study group tried to find the answers to these questions:

In North Carolina, will the pamphlet fulfill the purpose for which it was intended? Will it be equally effective for all demographic groups in the State? Will its effectiveness, if any, justify the cost and effort involved in its distribution?

To answer these questions an experimental and a control group were set up in 17 counties in North Carolina, selected to give a cross section of the population. Pamphlets were sent to members of the former but not to those of the latter group. In a few instances control families obtained one or more issues of the pamphlet. Replies from these families were taken into consideration in analyzing the data, the report explained. A questionnaire schedule was formulated and interviews, arranged for at well-child conferences, were wire recorded.

Reception Favorable

Approximately 2,200 home interviews were conducted with mothers to ascertain through questioning their attitudes and practices regarding infant feeding. While the re-

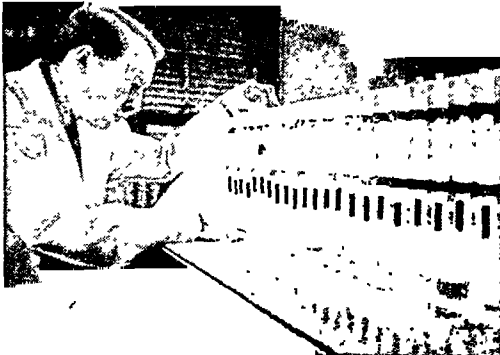
sults are not clear cut, the data suggest that "Pierre" had relatively little or no beneficial effect upon feeding practices.

"There is no question," the researchers said, "that 'Pierre' was favorably received." Replies to a questionnaire indicate that parents favor continuing the series. In fact, 90 percent of those who answered said they were saving the pamphlets. The preliminary evidence nevertheless raises a serious question about routine gratis distribution of "Pierre" or any similar material, the study group concluded. "An explanation for the apparent failure of 'Pierre' to modify behavior patterns is still not provided."

Pretesting of Materials Increases Usefulness

By pretesting our health education materials in rough form, "we can find out whether they make good sense to persons who have experiences different from our own," said Andie L. Knutson, Ph.D., chief of the experimental and evaluation services branch in the Division of Public Health Education, Public Health Service.

He defined pretesting as a means of obtaining the other man's perception or interpretation of a message



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so that changes can be made to take into account his pattern of understanding and his way of life.

Dr. Knutson cautioned that any pretest technique used should be focused on the reactions of individuals similar to those for whom educational materials are intended. Persons of different economic, social, and educational levels, he commented, vary so widely in experiences, wants, and values that they cannot view all social situations alike.

Tests Identify Barriers

"We have found it useful to plan pretests so that they yield information about potential barriers to effective communication," he said, adding that "pretests will help to identify these barriers," and steps can be taken toward a successful program.

Dr. Knutson pointed to the value of applying objective readability tests and word lists to materials in their developmental stage for determining whether words and concepts have a common meaning.

Members of the intended audience should review the material, he said. Their responses would be helpful in overcoming misunderstandings and obscure portions.

Exhibits and Posters

An exhibit or poster intended for wide distribution should be pretested in a situation similar to the one in which it will be used, Dr. Knutson continued. He suggested that an observer stand with a stop watch some distance away from an exhibit or poster to record how visitors behave during a given period of time: How long do they stop? How does this time compare with the time it takes to view the exhibit completely? What are their comments?

He further suggested a few simple questions to ask visitors as they leave an exhibit: Why did you stop to look at the exhibit? What did you expect to see? What did you find most interesting, least interesting? What would you like to know more about?

Also to be considered, the social psychologist added, is whether people find something in the information to satisfy their wants. But "it is not sufficient for health education to tie in with existing patterns of motivation," he commented. "What is presented must help individuals to achieve health goals with a minimum of disruption of their ways of life. It is unreasonable to expect new practices to be readily accepted if they conflict with deep-rooted habit patterns. At the same time, it is wasteful to re-educate more than is necessary to achieve adequate improvement in health behavior."

Pretests are most helpful when a program is being developed, but they cannot replace exploratory studies nor substitute for sound evaluation, he concluded.

Adult Education Group Defines Interests

The Adult Education Association, comprising specific interest groups and having geographically distributed administrative centers, offers a common meeting ground for those interested in any aspect of adult education, including public health education, declared Fern Long, Ph.D., adult education supervisor of the Cleveland Public Library.

Dr. Long felt there is complete agreement among interested organizations about the ultimate objective of adult education, which is "the development of a citizen body of free men and women, alert to the issues of this time in which we live, informed, thinking, questioning, relating thought to action and action to thought. Indeed, a democracy cannot be viable without that kind of citizenry," she said, but warned that "although the objective may be so simply stated, the achievement of the objective is far from simple."

Information Clearinghouse

This new (1951) organization wishes to be broadly representative

of educational groups, she continued, in explaining the structure of the Association's Council of National Organizations, a group of national organization representatives, including the APHA, which meets periodically for special objectives. The council can be a clearinghouse of information, she said, and, through a news letter to various organizations, a medium for exchange of ideas, materials, and methods.

Organization of adult education on State and regional levels has been made possibly by a 3-year Ford Foundation grant, Dr. Long reported. Conferences will be held to discuss, and explore ways and means of developing adult education on those levels, she said.

"Machine Thinking" Hazard To Health Education

"Machine thinking" was termed by Mayhew Derryberry, Ph.D., as one of the pitfalls facing health educators in their task of persuading people to change their health behaviors.

Dr. Derryberry, president of the Society of Public Health Educators, and chief of the Division of Public Health Education of the Public Health Service, spoke at the second annual meeting of the society.

He cited the frequently encountered mechanical step-by-step directions for organizing community health education programs, which are distributed as a packaged program with accompanying news releases, radio scripts, and posters.

"The machine—the mass producer of progress," as one of our cultural symbols, has already conditioned some of the methods that have been tried, such as the wartime job instructor training, he said. Dr. Derryberry explained that he was not endorsing a haphazard solution of problems but was questioning blind application of rigid mechanical procedures to human beings, personalities, and communities, each

with unique experiences, goals, aspirations, and ways of working.

Administration vs. Performance

A second hazard, he said, is the tendency to be more concerned with administrative structure than with the work to be done.

Communities, he explained, are urged to organize councils of every description, using a specific structural pattern similar to that of some other organization. The structural pattern may include items about membership, representation, administration, committees, by-laws, and so on.

"Any administrative arrangement is acceptable," he said, "if it permits and encourages the health education staff to work jointly and effectively with all other agency personnel in the planning and execution of the program."

Dr. Derryberry named as other hazards, the development of a jargon which has meaning to the profession but not to the laymen outside, use of a familiar technique for widely varying situations, and the tendency among some practicing educators to divert much of their professional efforts into research.

Varied Techniques Needed

The common tendency, he said, is to apply the habitually used techniques to all programs—role-playing, the buzz session, participant observation of group discussions—whatever has been successful in past meetings. Each situation must be analyzed and a method specifically selected or developed to meet the needs, he declared.

Research is needed, Dr. Derryberry said, but the work of the health education practitioner is of equal importance. Persons with native investigative ability should be enlisted for research work, while the practitioner concentrates his efforts on the translation of research findings into action and makes science contribute to the daily lives of people. "It is doubtful," he said, "if the two objectives, basic research

and health education service, can be achieved at a high level of competency by the same individual."

But beyond the hazards are challenges, Dr. Derryberry pointed out, noting that while education has always been employed to some extent in traditional public health programs, "we are now entering an era in which the health problems are such that little can be done of a preventive and palliative nature unless an effective education program gives the people an opportunity to learn their responsibilities." He mentioned as fields that are increasingly looking to educational methods, occupational health, geriatrics, hospital care, vocational rehabilitation, and civilian defense. Among the increasing calls on health educators, he emphasized particularly the challenges and responsibilities in the international health field.

Public Health Personnel Analyzed at Yale

The Yale Public Health Personnel Project, on completion, will provide information on about 6,000 items concerning individual activities, backgrounds, experiences, and working relationships of public health workers, Edward M. Cohart, M.D., of the Yale University Department of Public Health, and William R.

Willard, M.D., of the State University of New York Medical Center at Syracuse University, announced.

The acute personnel shortage, the increasing demand for new services, and the high rate of personnel turnover in the public health field were among the factors prompting this study. Financed by a research grant of the Public Health Service, it is expected to help provide a partial base for the solution of some of these problems, they said.

More than 1,000 workers in State and local health departments and visiting nurse associations have spent an average of 3 hours at two or more interviews, and about half of them have participated in time studies of 5 days or more. Some voluntary health agency employees were also interviewed through a grant provided by the National Tuberculosis Association. The study has been going on for 2½ years and tabulations and analyses are now being made, they stated.

Concerning health education, the data will provide experimental answers to the questions: What are people in public health doing in health education? What are health educators doing in public health?

"When we complete this study, we should know more about the . . . collective professional lives of health educators and other public health personnel than they do themselves," they concluded.



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Nursing Home Responsibilities Of State Health Departments

Although 46 States have some statutory or regulatory provision for State supervision of nursing homes, much study and research are required in this rapidly expanding field to standardize their establishment and functions. Two papers reviewed the historical background, activities, and the many problems to be solved in nursing homes.

Nursing Homes in Illinois Licensed and Supervised

The public health nurse is an important member of the health department team concerned with the supervision of nursing homes, according to Margaret Ranck, R.N., consultant nurse, Illinois Department of Public Health. In the State health department, she explained, nurses, along with engineers or sanitarians and nutritionists, serve as resource persons and as consultants; in regional and county health departments, they make visits to the homes, give direct counseling to home owners or supervisors, and make recommendations for improvements.

Illinois Act Revised

Illinois has had statutory provision for State licensing and supervision of nursing homes since 1945, Miss Ranck noted. The act was amended in 1951, and the minimum standards, rules, and regulations set up under the act were revised in 1947 and 1952. Illustrating the techniques used in the State health department, she described the methods in obtaining the 1951 revision. Department consultants, she said, pre-

pared a rough draft of proposed revised standards. This was submitted to numerous interested groups and persons—members of the standards committee of the Illinois Association of Nursing Homes, some of the nursing homes, every full-time health department in Illinois, and Public Aid Commission social workers.

"This proved to be a slow but effective way to revise standards," she remarked. "Acceptance, both by the homes and by the health department teams, has been quite encouraging." She believes that future changes in standards should follow a similar pattern of development.

It is with the groups who wish to provide superior services and with the potential home operator that the nurse has her most satisfying experiences, Miss Ranck pointed out. After the necessary preliminary steps have been taken by the State health department and the prospective home operator, a nurse in a local health department visits the prospective home operator to answer questions and to make a tentative decision as to whether the person should be encouraged. Staff, equipment, and program of the proposed home are discussed during this visit. The nurse makes recommendations and sends the State health department an evaluation. A final visit is made by members of the local health department after the home operator makes final application.

Health Department Helps

The State health department helps to improve the care of residents of nursing homes by its work with the Illinois Association of Nursing Homes, Miss Ranck maintained. Public health nurses serve as discussion leaders, as resource persons at

meetings, and as speakers on nursing care. They are presently helping the association develop a nursing home procedure and management manual and are working with it and the University of Illinois in holding semiannual institutes on business management for nursing homes. In regard to the latter, Miss Ranck said that the large out-of-State registration for the current institute indicates the need for public health nurses in other parts of the country to help in the development of educational resources.

Standards, Ethics, Policies Needed in Nursing Homes

"At long last, we in the health field . . . are beginning to face our responsibilities in regard to nursing homes," announced Theda L. Waterman, R.N., M.P.H., executive director of the Central Agency for Chronically Ill, Milwaukee, Wis.

Miss Waterman termed the present situation "not good," and attributed it to the phenomenal increase in the number of nursing homes since World War II and to the lack of experience and preparation on the part of many operators. When most of the 14,000 homes now in existence were set up, she said, there was no one to assist the operators, to give them counseling and guidance.

The operators themselves have realized their need for standards, a code of ethics, and personnel policies, she noted. They are organizing into associations for mutual help and are looking to the nurses, in particular, for guidance and assistance.

One of the first problems that frequently arises, Miss Waterman remarked, is whether or not there should be any attempt to classify nursing homes—according to age of patients admitted, type of care required, type of disease, or financial status. She does not believe in many arbitrary classifications, pointing out that classification might neces-

sitate frequent transfer of patients from one type of home to another or might result in "labeling the patient."

Medical Care Inadequate

"In most of these homes, medical supervision is far from adequate," Miss Waterman stated. Hesitancy on the part of both the patient's family and the home operator to increase the cost of care by calling a physician, failure to recognize the need for a physician, and the frank disinterest of some physicians in cases of long-term illness were pointed out as contributing factors. "There is a need," she said, "for a more systematic and effective plan for sustained medical supervision with periodic evaluation of the patient's condition."

She noted that nursing care is excellent in some homes but cautioned especially against homes accepting patients who need types of services the home cannot give.

Rehabilitation, a service given little attention in the past, can be of real value to nursing home patients, Miss Waterman maintained. She noted that the practice of putting people to bed and keeping them there is bad for the patient and will, in time, burden society with a vast number of invalids. Rehabilitation programs, of course, can be conducted only in homes that provide adequate medical supervision and have adequate nursing personnel, she said.

Central Locations

Miss Waterman also stressed the importance of pleasant, cheerful surroundings in nursing homes and the patient's need for privacy and space in which to keep his "treasured possessions."

Concerning location, the nurse advised that homes be near good transportation, for the convenience not only of the patient's family and friends but also of the personnel. A central location will also help to insure regular visits from the physician, she added.

Business Methods and Standards In Health Administration

The success of a performance budget was reported to the health officers section of the APHA, while the Association of Business Management in Public Health was told how a joint Children's Bureau and Public Health Service account simplified procedures in one State, and how costs of validating categorical grants might be reduced. The combined State public health plan of the Children's Bureau and the Public Health Service was reported to be favored over the separate plans now in use. Performance ratings, work standards, and the function of the nonmedical administrator in public health also were discussed.

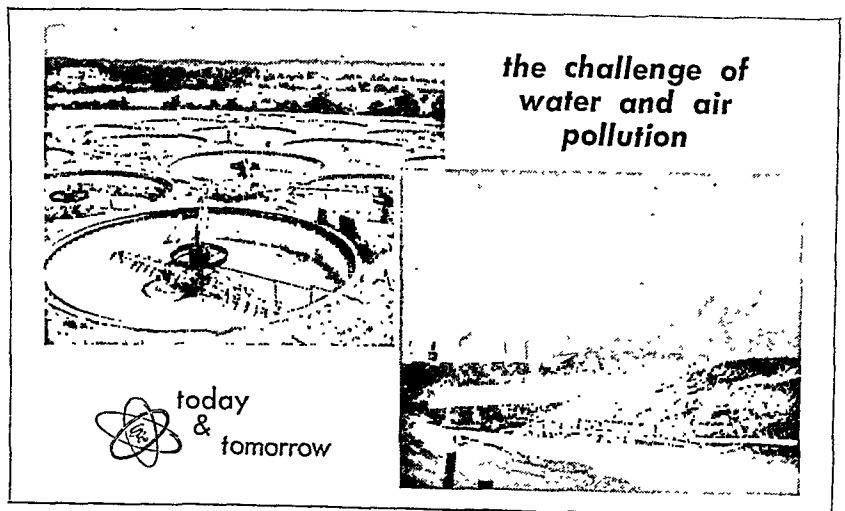
Joint CB and PHS Account Simplifies Procedures

Keeping an account which covers all Public Health Service and Children's Bureau funds allotted to Kan-

sas has saved time and simplified accounting procedures and preparation of reports for the Federal Government, Eugene W. Hiatt, business manager and attorney, Kansas State Board of Health, reported.

In addition to the one account sheet for these combined funds, the division of general services and administration keeps a sheet for each of the Public Health Service categorical funds and for funds "A" and "B" of the Children's Bureau, Mr. Hiatt stated. Also, he continued, one account sheet is set up in each division of the health department, showing the total amount of Federal funds allotted to that division, the amount and percentage of these funds which come from the Children's Bureau and from the Public Health Service, and what percentage of the total allotted to the health department by these organizations is represented by these amounts.

Each division in the health department sends to the division of general services and administration a quarterly report of the amounts expended from each fund, he said, and these reports are accumulated and sub-



mitted to the Children's Bureau and the Public Health Service.

As a result of this procedure, the speaker concluded, only one account is posted in each division, one ledger card shows the amount of funds available in the division from the Children's Bureau and Public Health Service funds, and time is saved in bookkeeping and in preparing monthly budget control reports. The State auditor and the State treasurer, who issue warrants and maintain the account balance, also benefit, since they now have only one account for Federal funds allotted to the health department instead of the eight or nine formerly kept.

Validating Categorical Funds Is Costly

Compliance with Federal reporting requirements for establishing the validity of expenditures of categorical grant-in-aid funds to States is costly in time and in money, Earl O. Wright, chief, division of administration, Ohio Department of Health, maintained.

With reduction of Federal grants to State health departments, the detailed planning of reports, evaluation schedules, and coding procedures to meet the requirements of the Federal Health Grants Manual is becoming increasingly difficult, he said. The restrictions imposed by this manual require the use of more elaborate forms than are necessary for evaluation reports and periodic summaries of activity needed by the State, he continued, and the cost of such reports should be carefully evaluated in relation to the amount of Federal grant-in-aid funds received by the State.

Ways of Reducing Costs

Mr. Wright suggested three ways of reducing the cost of validating categorical grants from the Children's Bureau and the Public Health Service: a 2-year cost accounting project to determine the actual amount of money necessary

to maintain accurate records; State budgets set up according to the State's judgment of their usefulness from the standpoint of the best interests of public health in its broad application, and allocation of grant-in-aid funds on the basis of public health results in the States; reduction of the percentage of funds prescribed by the manual for specialized expenditures and increase of the percentage allowed for supporting services.

The speaker also suggested that the Association of Business Management in Public Health formulate a plan suitable for use by all States, with minor modifications because of variation in legislative requirements, the plan to be submitted to Federal authorities for approval of its use instead of the present expensive machinery required for maintaining accurate records on expenditures of categorical funds.

Combined State Plan Favored in Field Test

In New York, 1 of 10 States in which field tests were made of the combined State public health plan of the Children's Bureau and the Public Health Service, participants almost unanimously favored this type of plan over the separate plans now in use by the two agencies. So stated Irma A. Feldstein, associate examiner of methods and procedures in the office of planning and procedures, New York State Department of Health, in reporting that State's experience with the combined plan to the Association of Business Management in Public Health.

This plan is designed "to provide in one document specific and concise descriptions of plans for public health programs," Mrs. Feldstein said. The report is to be used by the Children's Bureau and the Public Health Service in administering grants-in-aid for public health programs.

The major points which characterize the new plan now in use, the speaker said, are: (1) chapters, or titled plan schedules, designed for reporting specific public health programs; (2) the plan for executive operations, in which the commissioner of health reports his plans for the coordination of all health department activities, for new programs, for special problems and how he plans to solve them, as well as the manner in which supporting services, such as public health education, laboratory, local health services, nursing, nutrition, and statistics, contribute to the over-all operation of the department; and (3) the possibility of substituting plans of State design, provided the substitute plans include as a minimum essentially the information requested on the printed schedule.

Preparation of the Plan

Preparing the plan was a time-consuming task, Mrs. Feldstein stated. The assistant commissioners of health, their program directors, and a representative of the office of business administration reviewed the schedules. The program directors and the director of the office of business administration then conferred with representatives of the Federal Security Agency regional office. Other meetings were held by various groups and combinations of groups before the plan could be completed.

Final reports from all participants were collected, collated, and sent to the regional office, with the commissioner's plan for executive operation. Evaluation questionnaires also were sent to the regional office.

Mrs. Feldstein suggested that when this health plan is put into nation-wide operation the instructions and plan documents be sent to participants at least 5 or 6 months in advance of the return deadline. This will permit more precise planning, better coordination and clearance, more complete review, and assurance of meeting the deadline for its return, she said.

Do Performance Ratings Measure Performance?

Both supervisor and employee have a natural aversion to the service rating as a "so-called scientific measuring instrument in the highly subjective field of human relationships," Henry A. Kjentvet, B.S., director of personnel, Wisconsin State Board of Health, told the Association of Business Management in Public Health. Perhaps no other instrument for improving employee-employer relationships has provoked so much controversy, he said, pointing out that the problem is a "quarrel with form rather than substance."

Evaluation of an employee's performance should be a continuing process and not withheld from him until a specific period of time elapses, Mr. Kjentvet believes. "Formalized service ratings" should be dispensed with entirely, and any type of performance evaluation should be a "matter of importance only between the employee and his immediate supervisor," he also believes.

Noting the official and unofficial decline of ratings, Mr. Kjentvet said that personnel technicians in Wisconsin were seriously considering eliminating the legal requirement for annual employee ratings.

The Federal Government's recent overhaul of its rating system was "defeated before it was ever undertaken," he said, because of the impossibility of developing an objective rating acceptable to employees when it must "carry implied criticisms of employee effectiveness." Assuming that any individual "worthy of his hire is going to be happy over the fact that weaknesses, which he might otherwise feel free to discuss with his supervisor, are going to be made a part of an official record, represents a shocking amount of ignorance of human behaviorism," he said.

Evaluation of Manpower

Mr. Kjentvet pointed out that management has reached high tech-

nological proficiency in its system of checks and balances for evaluating "money, material, and method," but when it comes to measuring skills and individual employee achievement, it inevitably finds itself confronted with a significant area which can render all predictive efforts highly erroneous. "This is the area wherein the ideas, procedures, and techniques which have so painstakingly been developed by one group of human beings rests for their success on the manner in which they are implemented by quite another group," he said. The one basic justification of the service rating rests on its attempt to record an inventory which summarizes the capabilities and skills management has available in manpower, he stressed, but so far, today's technological advances have outstripped sociological advances.

"Individuals in a supervisory capacity who must . . . assess the aggregate of skills available to them so often lose almost completely any semblance of the objectivity which they can and do employ in other matters and render their judgment in an atmosphere of emotion," he said.

Supervisor's Dilemma

A conscientious supervisor is honestly disturbed by two difficult questions, Mr. Kjentvet stated. He must ask "What do I know about the

employee and his work?" and "What evidence is there to sustain my decision?" If he cannot answer, he must resort to some subterfuge. Also, he is frustrated by a genuine uncertainty as to whether another supervisor, in the same department and using the same employee classification, will even attempt to reach his minimum of objectivity, he added. "Thus," he said, "it may be seen that the typical supervisor in the preparation of a performance evaluation report is assailed by certain doubts which can only serve to increase his feeling of indecisiveness and can only generate ultimate antagonism toward a system which places him on the horns of a managerial dilemma."

Operating officials, too, must recognize that the possession of outstanding academic and experience qualifications does not "a priori, mean that they are good supervisors," he said. They will have to concede that despite the errors of personnel technicians, the amount of hostility which has been generated toward the introduction of any method for employee evaluation is hardly commensurate with the magnitude of such errors, he went on. And they must recognize the innate fallibility of human beings which is not "shucked off" when an individual is elevated to the role of a manager of people, he continued. Supervisors



today
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rehabilitation—

physical
vocational
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must no longer "persist in their dogged determination" that their own positions are exempt from scrutiny and evaluation on the basis that that their jobs cannot be definitely evaluated because of intangibles and long-range goals, or because "it would be degrading," Mr. Kjentvet added. "If the intangibles of a job are such as to preclude progress measurement of any sort, then it might be proper to give serious consideration to its abolition," he said.

In personnel management, Mr. Kjentvet said, "we have been all too inclined to attempt to develop our 'systems' within the provincial atmosphere of our own ivory towers," adding that although there were sound reasons, including the apathy and antagonism of operating officials, they were not sufficient to "offset the good which might have been done had we had the patience to educate not only the supervisor but the employee to the importance of mutual cooperation in the development of a sorely needed instrument for more effective management."

Richmond Notes Success With Budget Procedure

The experience of the Richmond, Va., Health Department with its performance budget shows that legislative bodies will appropriate funds for health services when needs are demonstrated and requests are substantiated by comparative service figures.

This was the conclusion reached by William R. Harton, Jr., B.S., administrative assistant in the Richmond Health Department; E. M. Holmes, Jr., M.D., M.P.H., Richmond's director of public health; and former Richmond budget officer, John A. Donaho, M.A., now budget consultant to the State of Maryland.

The Richmond performance budget shows, in both narrative and statistical form, a year-by-year comparison of the programs of work accomplished and the services performed in return for funds appropriated.

Major emphasis, they pointed out, is placed upon work programs and upon the identifiable key factors in the workload—the work units and unit costs—thus providing an opportunity to correlate the annual statistical report with the budgetary process and enabling the health department to systematically and realistically plan programs based on past experience and actual future needs. In the nursing program, for example, the total visits made and the unit cost is a more effective showing than a mere request for total operating funds to be used in purchasing so many supplies and hiring so many nurses, the officials said.

Planning Flexibility

A budget, they stated, is "a plan of work with dollar signs attached."

In the efficient conduct of a modern health department, modern budgetary and accounting systems are the effective tools of management in program planning, they said. Planning flexibility similar to the provision of contingency reserve funds by prudent management is possible with the performance budget because program activities are reviewed quarterly, they pointed out.

"A budget system which emphasizes services to be rendered rather than funds to be expended will result in a more satisfactory and effective health service to the community. This is particularly true if other essentials of a good budget system are present, which would include a modern statistical reporting system, adequate accounting procedures, and, finally, leadership by a competent executive who has a broad and thorough knowledge of the complete operations of the department," they observed.

Since the adoption of the performance budget, programs of home medical care, dental care, housing sanitation, and "acceptance of responsibility for the chronically ill" became new Richmond health services, the administrators said. Prior to the change, in the fiscal period 1947-48, the health department re-

ceived a total appropriation of \$841,728 for all services—a per capita expenditure of \$3.83. By fiscal 1952-53, the appropriation had increased to \$1,494,546, a per capita increase of \$2.66, and an appropriation increase of \$652,818 in 5 years, they reported.

Says Work Standards Are Effective Tool

Performance standards help to develop programs of personnel administration and provide a means of measuring employee performance, Charles B. Frasher, personnel consultant, Professional Examination Service, American Public Health Association, stated before the Association of Business Management in Public Health.

Mr. Frasher defined a performance standard as "that quality and quantity of output which is expected of a worker in a program of public health."

Despite reluctance to accept work standards at certain levels of employment, it is possible to measure output and to develop performance standards for professional as well as for clerical and other nonprofessional workers, the speaker continued. Also, experience has shown that fear of the probable effect on the morale of employees is apparently unfounded.

The establishment of performance standards can be approached in two ways, Mr. Frasher said. In the first, standards are set up so that each person's performance can be compared with that of other individuals doing similar work. In the second, performance expected is the same for all persons, but the past experience, education, job training, and age of each employee are taken into consideration. The latter approach, developing a performance standard for an individual rather than standards for a class of positions, deserves further consideration and probably

represents the most humane approach, he maintained.

Developing Work Standards

The first step in developing performance standards is to determine their desirability, Mr. Frasher said. A committee should then be appointed, with subcommittees representing the various professions involved; later, the lower level supervisors should join the discussions; and finally, all employees should be informed of the project. The speaker said that at some stage of the planning the method of approach should be decided on—whether to match persons against other persons or to match the individual against himself.

When plans have been completed and a decision reached as to the approach to be used, the procedures decided upon should be tested on a small group, to locate, eliminate, or improve factors which are not effective, Mr. Frasher stated. As a last step he suggested that the plan and its results be discussed with other organizations which have had similar experiences.

Administrator's Function in Public Health Noted

How the nonmedical administrator can help health specialists do a better job in public health fields was discussed by an eight-member panel conducted by the Association of Business Management in Public Health. The panel was composed of:

Thomas R. Hood, M.D., M.P.H., executive secretary, Kansas State Board of Health; Herbert R. Domke, M.D., commissioner of health, St. Louis County Health Department; Maude B. Carson, R.N., chief, bureau of nursing, Illinois State Department of Public Health; Jerome H. Svore, M.S., of the environmental sanitation services, North Dakota State Department of Health; David B. Ast, D.D.S., M.P.H., director, bureau of dental health, New York State Department of Health; Robert O. Yoho,

M.A., director, division of health education, Indiana State Board of Health; Albert E. Bailey, Ph.D., director, office of statistics and records, Pennsylvania Department of Health; Irma L. Adams, B.S., director, bureau of laboratories, Missouri Division of Health. J. W. Brower chief, section of departmental administration, Minnesota Department of Health, member of the association, served as the moderator.

Needs Broad Training

Mr. Svore, Dr. Domke, Dr. Hood, and Miss Carson joined in presenting a composite picture of the nonmedical administrator's position.

Although the designation is a negative title, the position definitely involves management duties that bring this administrator into a closer working relationship with the health officer than any other program aide. With such responsibilities, plus the fact that he frequently speaks for the agency, the training and experience of the nonmedical administrator cannot be too broad in the fields of business, public, and personnel administration. He is in the position to contribute to the betterment of over-all administration and thus aid all programs.

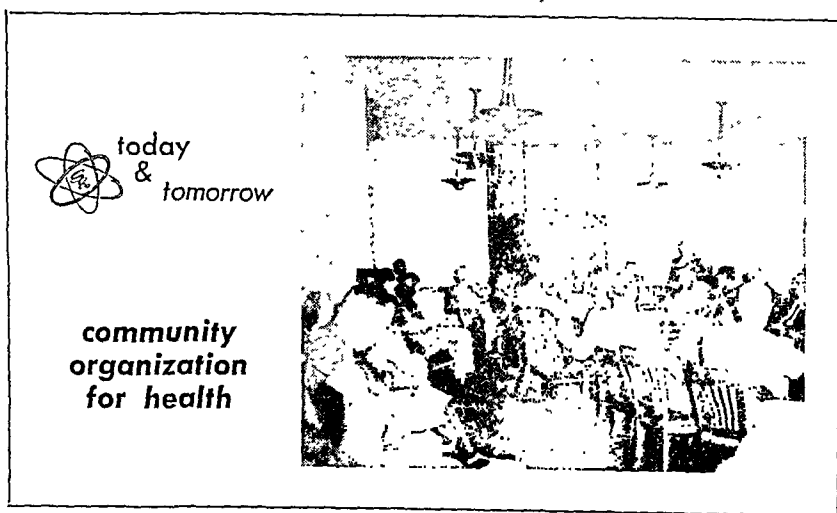
In Mrs. Adam's view the nonmedical administrator should take a real part in planning and coordinating activities and bring new techniques and fresh approaches to programs.

Dr. Ast emphasized that if optimum results are to be gained the administrator must know the aims of the program. He cautioned the administrator not to go to unreasonable lengths to determine what is or is not a good program but to rely to some extent on professional opinion.

Mr. Yoho felt that the administrator should remember at all times that the public health program does not exist so that the business manager can function. He emphasized that the administrator, by effectively taking part in small conferences, could indirectly be of great help in the conduct of programs.

Dr. Bailey, also stressing the participant concept, urged the administrator to recognize the need for taking people into more frequent consultation in the planning and the activities touching upon project operations.

Floor discussions centered around the use of the term "nonmedical administrator," the feeling being that the qualification is no longer essential and that such top aides should be called precisely what they are, the administrator per se. The role of the assistant to the local health officer was examined briefly and the need of his help appraised. The panel concluded that this position was rapidly coming to the fore in the team approach to the problems of public health.



Developments and Policies in Water Conservation

Progress and policies in water conservation were examined from several points of view during sessions of the APHA engineering section. From North Dakota water resource development was seen as a boon to the Nation's strength and to the health of the people. From Illinois came a plea for more extensive use of the interstate compact in the administrative approach to pollution control problems. From Pennsylvania came a warning about increasing demands by industry on usable unpolluted water.

North Dakota Planning Water Resources Uses

When the "Mighty Mo" is brought under control "in the foreseeable future," and full use is made of its waters, the Missouri River Basin will add much to the Nation's strength, in resource development and in better health for the population of the area, according to Jerome H. Svore, M.S., chief sanitary engineer of the environmental sanitation service, North Dakota State Department of Health.

Diversion of Missouri River water can be justified in large measure on the basis of sanitation and public health, Mr. Svore maintained. In some parts of North Dakota available water supplies and water for sewage dilution purposes are insufficient to meet the needs of a rapidly expanding industry, he said. Increased recognition and higher priority placed on water and sewage dilution needs for municipalities and

industry may favor diversion in these areas.

Several dams have been built throughout North Dakota to meet municipal water supply needs, to supplement river flows for pollution abatement during droughts, to provide protection, and to supplement existing water supplies, he added.

Although water needs in the State and sewage loads resulting from municipal and industrial development are comparatively small, impoundment of Missouri River water will necessitate at least primary sewage treatment, the engineer said.

Mosquito Control

Mosquito control in irrigated areas is of major concern to health officials in North Dakota, where encephalitis is apparently endemic, the speaker continued. Studies of species and numbers of mosquitoes have been conducted, as well as an education program for agencies which maintain and operate irrigation systems. In addition, cities and district health departments need assistance in planning and organizing mosquito control programs.

Water resources planning in the Missouri Basin has been greatly aided by cooperation between the Inter-Agency Committee of five governors, the engineer in charge of the Public Health Service River Basin Office in Kansas City, and other Federal agencies, Mr. Svore stated. Full utilization of the water resources of the basin will bring about industrial expansion and population growth, which will necessitate careful watching and control of water resources. As an example of future industrial activity, he pointed to the lignite deposit in the western part of North Dakota which he said has been estimated to be sufficient to supply the Nation's coal needs for 200 years.

Claims Water Pollution Best Solved By Compact

"An administrative approach to the control of interstate water resources and pollution control problems, other than through a Federal agency or one of its creation, is by means of the interstate compact," declared C. W. Klassen, chief sanitary engineer of the Illinois Department of Public Health.

He affirmed that "the States [can] realize and discharge their duties in the pollution control phase of a regional water resource plan; that they can and will [intelligently and reasonably] use this resource; and that, through interstate compacts and agreements, they will meanwhile discharge their duties and obligations to each other while still preserving their sovereignty."

Water pollution control programs should strive to serve adequately the over-all aspects of our entire economic and social environment without emphasizing one aspect to the detriment of another, he said. Waters overused for waste disposal, for example, may not adequately serve for industry, agriculture, water supply, or food sources.

Water usage is part of the foundation on which a practical program of pollution control must be based, Mr. Klassen continued. And the increasing interdependence of regional interests calls for the fitting of State programs into cooperative regional basin-resources plans.

Integration Needs

Successful integration depends upon three factors, he said—the composition, objectives, and policies of the State's control agency; the priority of water usage in the regional basin; and the type of authority exercising jurisdiction over the basin's water resources. He emphasized that full cooperation among all interested public and private groups is necessary to the success of any State or regional plan.

Mr. Klassen stressed the need for

greater uniformity among the States on industrial waste policies. He recommended that at least 45 percent of the total suspended solids be removed from all sewage and wastes discharged into intrastate waters. Sewage and wastes discharged into interstate waters, he said, should receive the degree of treatment required by applicable interstate agreements.

Since water must serve many varied facets of modern life, "we cannot hope to have an 1852 water environment and quality in a 1952 industrial development," Mr. Klassen continued. Industry, like man, must have usable water in order to survive. However, waste treatment processes often depend upon production methods. As these methods constantly change, so do the solutions to the waste problem, he said.

The States should know what industry is accomplishing in waste treatment, he said, and industry should be ever aware of regulatory requirements or policies affecting it. To be "part of the show," industry should be present "when the curtain goes up," with committees participating in the initial discussions of pollution control by regulatory agencies.

Ohio River Pact

As an example of the integration of State programs into regional, interstate agreements, Mr. Klassen cited the 1948 Ohio River Valley Water Sanitation Compact among New York, Pennsylvania, Virginia, West Virginia, Ohio, Illinois, Indiana, and Kentucky. A commission of representatives of the signatory States and the Federal government was empowered to: make pollution studies; confer with national and regional planning agencies; recommend legislation to achieve the compact objectives; and consult with industries and political subdivisions within its jurisdiction.

By majority vote of the commissioners of a majority of the States, the commission may order the abate-

ment of pollution in any signatory State—provided it is voted for by a majority of the commissioners from the State affected by the order. The latter provision maintains the State's sovereignty, said Mr. Klassen.

He felt that the Ohio River Compact was probably the greatest of this type of cooperative effort ever undertaken by so many States to solve this sort of problem.

Industrialization Presents Water Supply Problems

Industry is making alarmingly increasing demands on the decreasing supplies of usable unpolluted water in the United States, declared R. M. Heister, advanced sanitary engineer of the Pennsylvania Department of Health.

He pointed out that "the total capacity of the treatment plants operated for industrial supplies is imposing. The industrial demand," he said, "is a most important factor which contributes in many cases to the local water shortages . . . discussed so widely over the country."

Industrialization of an area brings greater needs for clean and potable water supplies, he said. Many of the Nation's water facilities are now so overtaxed that new industries are forced to develop their own supplies.

Our population, he continued, has increased 600 percent during the past century and our industrial growth has doubled in the last decade. Water use, however, has increased by several thousand percent and an even greater disproportionate increase in its use is expected in the future.

Unless control and conservation measures are instituted, he warned, the saturation point of water-using industry is not only being approached but has already arrived in some areas. He felt that the problem is particularly acute in the East North Central region of the country.

Abundance Abused

The United States has abundant ground and surface water to supply its needs, Mr. Heister continued, but all areas do not share equally in the abundance. Also, he said, two man-made problems—ground water depletion and stream pollution—aggravate the situation in most industrial areas. In Pennsylvania alone, he stated, over 2,200 miles of waterways are lost for industrial or recreational uses because of acid mine drainage.

The principal industrial user of water is steel, he said, followed by the chemical industry, petroleum products, wood pulp and paper, the coke industries, and others. Many of them have water requirements



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Planning and Team Approaches To a Better Environment

The team approach to a better environment was the theme of a joint session of the APHA engineering section and the Conference of Municipal Public Health Engineers. It dealt largely with planning, and the problem was looked at in relation to city planning, with regard to the role of the health department, in terms of the contribution of long-range engineering planning, and from the viewpoint of the builder.

In other sessions of the engineers, additional problems requiring planning and appreciation of new environmental conditions were explored, including: defense area problems, use of the membrane filter in aerosol analysis, airborne contagion observations, noise as a factor in health, air pollution studies, the status of sanitary engineers, and sanitation problems of American Indians.

Health Departments Join In Urban Redevelopment

Stressing teamwork and collaborative planning, Edward R. Krumbiegel, M.D., Milwaukee health commissioner, said that the health department can contribute to the success of a "total community housing improvement program," by active participation in neighborhood conservation, rehabilitation, and redevelopment.

Practically all older urban communities are confronted with the decay or blight of certain residential neighborhoods, Dr. Krumbiegel said.

A blight elimination program embraces the protection of residential neighborhoods as yet unblighted, the large-scale improvement and modernization of moderately blighted neighborhoods, and the clearance and subsequent rebuilding of the most severely blighted areas, he pointed out.

Local development of plans for treating blighted areas is a "collaborative job," Dr. Krumbiegel noted, to be done by civic, business, labor, and neighborhood leaders in addition to the official planning agency, the schools, and such typical agencies as public welfare, health, tax enforcement, and redevelopment. The official acceptance of final plans through "appropriate local legislative action" is a necessary and vital step, he said, and collaborative planning assures that the "legislative gap between plans and operative programs will be successfully hurdled."

Role in Housing

Local health departments can contribute to better housing by appraisal of dwelling units, by the organization, education, and motivation to effective action of the citizens living in blighted areas, and by the enforcement of a housing code, Dr. Krumbiegel said.

"The health department, utilizing the personnel of its bureau or division of environmental sanitation, is the logical agency to perform the appraisal of dwellings," he said. Its contribution to effective citizen organization would be in making available "the services of health educators skilled in the techniques of community organization and group dynamics," he went on. Where neighborhood groups cannot effect voluntary correction of undesirable conditions, Dr. Krumbiegel recom-

other than volume. For instance, some may require a complete absence of hardness or solid matter while others, especially the chemical industry, need important and specific temperature qualifications in their water for cooling purposes. This requirement, he said, has led to the rapid growth of chemical industries in Kentucky, Texas, and other areas where cold water is available from underground sources, but it also has brought a rapid exhaustion of wells due to industrial overconcentration and heavy pumping.

Mr. Heister emphasized that despite the greatly increased demand for water and the fact that much of it is lost by pollution, the supply does not vary; yet our critical industrial areas may continue to expand by rigidly practicing conservation of available water resources. He recommended the recirculation of process waters, recharge of ground waters, installation of sewage and industrial waste treatment works, development of marine sources of supply through desalting processes, and construction of more multiple-purpose dams.

Progress Cited

As examples of what can be done, Mr. Heister cited, among others:

Experiments by Los Angeles County with an underground "water dam" to prevent the sea from seeping into the deep wells that supply a large part of the water for a half million people.

A reclamation project on the clogged Schuylkill River in Pennsylvania, which for more than a century had been receiving coal silt and debris from the many collieries on its watershed. All of the area's 47 collieries installed treatment works which prevent an estimated 2 million tons of silt and culm from reaching the river and its tributaries annually. Thirty-five million dollars was spent to dredge the river, 75 million dollars for sewage treatment plants, and 75 million on industrial waste treatment facilities.

mended the intervention of an official agency with police authority in the form of a housing code. "The health department is the most appropriate local official agency to enforce such a housing code," he said.

Dr. Krumblegel recommended two basic studies in the hygiene of housing which the American Public Health Association has already made available to public health administrators: an appraisal method for measuring the quality of housing; and a proposed housing ordinance. He hoped, he said, that the APHA would undertake the development of a guide for educators who may be assigned to operational programs designed to improve the hygiene of housing.

Progressive City Planning Correlates Health Needs

Participation of health officers is indispensable in the planning of better cities, Aimé Cousineau, D.Sc., C.E., director of the Montreal city planning department, declared.

City planning is not limited to a single profession, Dr. Cousineau said, but coordinates the resources and knowledge of the engineer, the architect, the landscape architect, the sanitarian, the jurist, the economist, the demographer, and the geographer.

In Great Britain, he pointed out, the laws relating to town planning and housing have been enacted as parts of the general health laws, thereby indicating the relationship between town planning and health.

The Master Plan

Good city planning, Dr. Cousineau said, requires the cooperation of "the city officials including health officers who have a background of long and accurate knowledge of their community, the citizens' organizations, and the professional planners, whose aim is not only to design but to preserve the beauty

and the amenities of a territory as well. With the aid of these groups, planners can draw up plans or revise them conforming with the highest standards that the science of city planning is able to develop, as they always have in mind that the region, the city, the community, the neighborhood, as well as the dwelling unit, constitute the home and social life."

Dr. Cousineau pointed out that the official plan, or city map, indicates thoroughfares, open spaces, and public utility routes, and pictures present conditions, but the city's master plan is concerned with the future and indicates the trend of future development.

The master plan, he said, "is a synthesis of measures to be taken in order to solve the numerous problems pertaining to the rational planning of a city, to its extension and sometimes to its partial rebuilding. It is a means to an end."

The City Plan and Health

Some of the other statements made by the Montreal city planner relating to public health and city planning are quoted:

On public services—"There is nothing, in either the design or operation of water works and sewage plants, which precludes such architectural treatment of the buildings

and landscaping of the ground as would make the ensemble a definite asset to the community."

On growth—"Any progressive community becomes convinced that the development of its territory can no longer safely be left to take place haphazardly . . . but that such development must be planned to make the best of all opportunities to conserve the values in material wealth and beauty and to enhance public health."

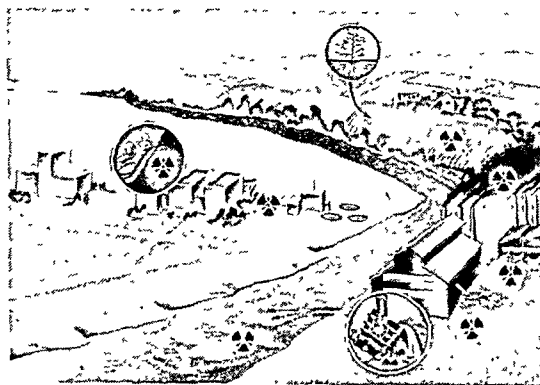
On traffic—"Preventing of injury and deaths from traffic accidents is just as important and promising a field of health protection as many other fields common to the planner and the health officer."

On housing—" . . . the greatest indictment of the present civilization during the past decades was that no adequate environment for living was provided, and this matter becomes a general public concern. This indictment shall hold true in both urban and rural communities, until such time as they will be free from slums."

On zoning—"Zoning not related to a master plan and sound economic policy may cause serious losses. These ordinances must not be arbitrary, discriminatory, or unreasonable but should secure the benefit of their protective features in the conservation of property values."

On recreation—"Open spaces

radioactivity and the public's health



today
& tomorrow

which have been found to assure health and happiness and to increase substantially the value of adjacent properties are considered an indispensable element of any city plan, and on this account health departments so concerned in the well-being of the population are always interested in their extensive development."

Home Builders Propose New Face for America

The National Association of Home Builders proposes a "New Face for America" through its six-point housing program, according to Leonard G. Haeger, Washington, D. C., the association's director of technical services and research.

Mr. Haeger described the builder's role in the team approach to a better environment, saying that the elements of good housing are good business for the home builder.

The NAHB program proposes that:

Every community require that all landlords maintain their housing to meet minimum standards of health, safety, and sanitation.

Every community launch a vigorous clean-up and paint-up program.

All dwellings found to be structurally unsafe be immediately condemned and removed in accordance with a city-wide plan.

Where entire areas of a city are found to be beyond repair, the buildings be demolished under city authority and within a complete plan for writing off the cost over a period of years through local taxation.

A direct subsidy plan be developed through local welfare agencies to help people who cannot afford to pay for proper housing. This must be done entirely on the basis of the need. The welfare agencies should insist that contributions will be made only when the family to be helped is in clean, safe, and sanitary housing.

All elements of the housing industry vigorously attack the problem

of providing lower cost housing for rent and for sale.

The above program, Mr. Haeger said, is based on builders' observations about slums: unless the profit is taken out of slum ownership, slums cannot be eliminated; low cost housing can be provided more economically by modernizing old dwellings than by building new ones; slums can't be eliminated simply by tearing down old buildings and replacing them with new ones. "Slums," he said, "result directly from neglect in keeping up the buildings and neglect in training the people."

Advise Advance Planning To Develop Fringe Areas

Many cities have found that some of the problems of fringe development can be avoided by careful advance planning and by establishing as a goal a well-ordered metropolitan community, stated Ray E. Lawrence, Black & Veatch, consulting engineers, Kansas City, Mo.

This goal can be reached, he pointed out, where the city planning commission, either acting alone or with county or township planning commissions, is able to exercise zoning control over an area extending for some distance beyond the city limits.

He suggested that a city can take the following actions toward accomplishing this goal: make a comprehensive study of existing land needs and probably also of future land needs for the populations anticipated for a reasonable period in the future; determine areas which can best be served by water, sewers, and other utilities and which are favorable for development; establish uniform subdivision regulations, including minimum lot sizes; and require all subdivision plats to be submitted to a public utility committee composed of representatives of agencies responsible for providing electric, telephone, water, and sewer service prior to approval of the plat.

He explained that annexation of fringe areas before problems of providing sewer service, refuse collection, fire protection, police protection, and other municipal services become acute is not always possible or practicable.

"The annexation of territory carries with it the obligation of providing the same municipal services which are enjoyed by the remainder of the city," he said. "To provide such services where annexations include large tracts of vacant ground between areas of development would impose a financial burden on the affected property and on the city as a whole. Also, the statutes of most States . . . involve restrictions and legal procedures which limit the extension of city limits."

Defense Areas Aided by Public Law 139

Appropriations made available in 1952 for the administration of Public Law 139 (The 1951 Defense Housing and Community Facilities and Services Act) enabled the Public Health Service for the first time to make loans or grants directly to municipalities for constructing community health facilities, reported M. Allen Pond, M.P.H., chief of the Public Health Service's Division of Engineering Resources.

Mr. Pond said that the Federal Security Agency and the Housing and Home Finance Agency, responsible for administering the act, established a joint policy committee to formulate consistent administrative policies between the two agencies. Also, he said, they make every effort to secure the fullest approval of and participation in each project by appropriate State authorities.

The act makes the Public Health Service responsible for assistance to community projects for facilities such as hospitals and health centers, water purification and sewage treatment plants, and refuse disposal facilities and services. The Housing

and Home Finance Agency assists projects for water source development, water distribution, and sewage collection.

The original Public Health Service appropriation of \$4 million did not provide for assistance to hospitals and health centers, said Mr. Pond. However, a supplemental \$4 million appropriation later permitted assistance to be granted to such facilities. The Housing and Home Finance Agency appropriations have totaled \$20,025,000.

"The program is neither to provide incentives . . . for necessary community facilities nor to compete with private lending sources," he said. "Rather it is to assist those communities which need additional facilities now and which they cannot reasonably provide without Federal financial assistance." The interest rate on such loans is generally approximate to that paid by the Federal Government itself on long-term loans, from 2.5 to 2.75 percent.

Assigns Priorities

The priorities of projects to be aided were assigned as (1) projects without which programmed defense housing could not be built; (2) projects the lack of which would not impede housing construction but without which the health of the community would be seriously jeopardized; (3) projects without which the defense program in that particular area would be appreciably delayed or impaired. Assistance to some projects had to be denied because the act prohibits the use of funds appropriated under it to meet deficiencies existing at the start of the present emergency, regardless of how desirable such projects may be from a public health viewpoint.

Loans and Grants

No funds may be made available to a community, he continued, unless it is in a "critical defense housing area," thereby having a defense plant or installation, existing or proposed; substantial in-migration; and a substantial shortage of housing and community facilities or services.

The "means test" clause of the act places upon the affected community maximum responsibility for paying for projected construction, he explained. Assistance may be given only when it is clearly evident that private borrowing would result in excessive tax or debt burdens for the community. However, determinations of communities' borrowing capacities are difficult to make, he stressed, and the joint committee felt it was not intended that a community completely exhaust its borrowing capacity before Federal financial assistance could be provided.

In some instances, said Mr. Pond, grants rather than loans may be made to municipalities with no assurances of a permanent population increase (for example, extra-cantonment areas or industrial areas with a large but short-lived impact). Otherwise, it would be literally impossible for them to provide facilities when needed, thereby seriously delaying the defense effort. Federal grants or loans on any project may not exceed that part of the facility's cost directly attributable to defense activities in the area and which are not to be recovered by the community from other sources. This limitation prevents the use of appropriated funds for correction of long standing facilities deficits, Mr. Pond explained.

As of October 1952, 208 areas had been declared critical under the provisions of the act. However, said Mr. Pond, of the approximately 70 applications to the Public Health Service for financial assistance, less than 50 came from these designated areas. Mr. Pond felt that the pressure for assistance would have been greater were it not for: (1) a general Federal policy of avoiding the development of new areas; (2) the large volume of public works construction since the end of World War II which was superimposed on the defense community facilities program of 1940-45; and (3) the comparatively sound financial condition of most American cities at the outset of hostilities in Korea.

MF Membranes Applied To Aerosol Analysis

The molecular filter membrane holds considerable promise as an effective tool for rapid and simple sanitary aerosol analysis, reported Alexander Goetz, Ph.D., professor, California Institute of Technology.

In view of the results of investigation to date, he feels that the expenditure of time and effort in a detailed study of the molecular filter's performance for airborne organisms under a large variety of



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conditions, as they may occur in the field, is justified.

The significance of the molecular filter in aerosol analysis is due to physical properties causing a unique retention mechanism which appears to be almost independent of particle size, he said. In his report, he summarized briefly these properties and their utilization. Among the points he mentioned were these: "The internal membrane structure represents . . . an extremely fine submicroscope network of great regularity, of which only the electron microscope reveals a significant detail. The structure, pore size, and so forth, can be controlled over a wide range by the production process."

"Another characteristic quality . . . is a distinct difference of the pore structure between the two surfaces of the sheet. The extent of this difference can be controlled and determines the performance of the membrane significantly. . . . The MF can thus act similarly to a two-dimensional screen, where the flow enters the filter on the side where the pore size is smallest; thus any contact between residue and filter is restricted to the top surface of the MF."

He also discussed the chemical, thermal, and optical properties of MF material and described the equipment for holding the membranes during sampling.

Experiments Described

Reviewing the work of the past 2 years in sampling and analyzing aerosols with MF membranes, Dr. Goetz described typical experiments with pure fumes and with smokes.

Commenting on these experiments, he noted that the performance of MF membranes on smokes can be less effective than on fumes as it depends upon the chemical affinity between the liquid droplets and the surface of the MF material. If the wetting between droplets and MF occurs, the former will be distributed over the inner surface of the latter and, after filling the surface capacity, may be partially redispersed by the outgoing airflow, he explained. However, for

most practical purposes, the retention is sufficiently complete, though clogging occurs sooner with smokes than with fumes.

Dr. Goetz also mentioned various field tests of aerosols through MF membranes. Contemporary with the A-bomb tests in Nevada during May and June 1952, experiments were conducted for the evaluation of radioactive atmospheric constituents, the results of which led to the decision to apply the MF instrumentation and technique used to emergency measures. Presently under way by the Air-Pollution Control Board of the City of Los Angeles is a systematic program for "smog" analysis.

Probably most important from the public health viewpoint, he pointed out, is the evaluation of performance of MF membranes with microbiological aerosols. Concluding his survey, he described examples of the work done in this particular sector, both in artificial aerosols and in the field.

Reports Limited Success In Ventilation Control

Experimental sanitary ventilation has succeeded to the extent that specified conditions of environmental control were fulfilled in control studies, reported William Firth Wells, B.S., associate professor of research in airborne infection, University of Pennsylvania School of Medicine.

Mr. Wells presented the latest 5-year review of progress in dynamic control of airborne contagion. The principle of dynamic control of airborne contagion, he said, was first demonstrated to the American Medical Association nearly a dozen years ago, and earlier, in 1932, to the American Public Health Association.

Participating in the continuing control studies are a number of hospitals, the Great Lakes Naval Training Station, the University of Pennsylvania, the New York State Health Department, the Westchester, N. Y.,

County Health Department, and the Medical Research Council of Great Britain.

Mr. Wells described some of the areas of progress:

Cross-infection was reduced when the air of the hospitals was excluded from, or purified in, operating rooms, burns units, premature wards, nurseries, or children's wards.

Contagious epidemics among school children were slowed down by sanitary ventilation experiments. An epidemic of measles among primary school children was stopped where the disease did not spread dynamically outside the school.

However, sanitary ventilation in schools did not stop infection of school children outside the schools. Where school children were exposed to carriers outside the school, colds were not stopped. Irradiation of a centralized rural school did not prevent the spread of measles through school buses. Irradiation of a village in a metropolitan area did not stop infiltration from neighboring communities.

Acute respiratory disease was a third lower where alternate barracks of a regiment of recruits at the Great Lakes Naval Training Station were irradiated. Though hospital admissions were reduced, infection of recruits quartered in the irradiated barracks by recruits from adjacent nonirradiated barracks was not entirely stopped.

Speech Interference Level May Be Clue in Noise Survey

Noise, it's agreed, can cause permanent and temporary hearing losses, interfere with necessary communication, or just disturb people, three Air Force officers reported. But noise effects below true hearing damage vary with individuals, accustomed environment, and type of sound, they indicated.

Reviewing noise as a health factor were Lt. Col. Alvin F. Meyer, Jr., MSC, deputy for environmental health engineering, Maj. Robert L.

Peterson, MSC, and Lt. Herbert B. Bell, MSC, Office of the Air Surgeon, Wright-Patterson Air Force Base, Ohio.

They reported:

The problem of precisely gauging noise effects is complicated by the widely varying adaptability of persons to noise. Individuals can and do function for long periods in noisy environments without apparent physical harm from the noise.

A community accustomed to occupations in which noise is a factor may accept high noise levels of the same general frequency characteristics. The absence of familiar noise may even be noteworthy. But the generation of sounds with a different frequency characteristic will become bothersome. A loud unexpected sound is more disturbing than expected prolonged noise. And the occasional occurrence of sound, like the drip of a water faucet, has more effect than a steady flow of water.

Noises Are Hazards

Studies conducted at nine large Air Force installations substantiate the observation that unless communication is important, noise below hearing damage levels does not reduce on-the-job efficiency. But noise that interferes with speech and understanding is definitely an occupational and health hazard. Examples are communication problems in control towers, air fields, residential areas with adjacent trains, and places in which heavy machinery is operated.

Temporary hearing loss has been reported at various noise levels. Other studies have shown gradual recovery on removal from the offending sound area. Ear plugs have aided similar recoveries. Partial recovery occurs during the time the patient is home from work, but complete recovery requires 18 to 24 hours. Hearing tests before employment and at intervals during the first few weeks or months can discover a workman's susceptibility to injury by noise. If susceptible, he

may be reassigned or required to wear ear plugs to avoid deafness.

A simplified method of interpreting the results of noise surveys in terms management and the general public can understand is needed. Speech interference level curves offer an excellent tool for engineering evaluation and can be adapted in conjunction with the total loudness of tones to give normal speech interference levels in percentages.

Air Pollution Problem Needs Long Research

"The solution of the problem of the chronic effects of air pollution on exposed populations is nowhere in sight and even the proper techniques are lacking," reported Charles R. Williams, Ph.D., of the Liberty Mutual Insurance Company, Boston.

"The main problems are those of coordination and financing," he continued. Although many, outstanding investigations are being conducted in specific related fields, he maintained there is no fully coordinated study of the health of communities having an air pollution problem. He felt that a determination of the role of atmospheric pollutions in affecting the general health of a population will require a pains-

taking and costly research for a long time.

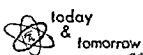
Dr. Williams emphasized that industry is not the sole source of air contamination. The public itself is a frequent primary factor in city air pollution, he said. Automobile exhausts, burning rubbish, smoke from home heating units, and many other individual activities make each person a contributor as well as a victim. However, he felt that more valid standards for permissible levels of contamination could be developed in controlling industrial effluents.

The air pollution problem is complex and extremely confused, Dr. Williams averred. Though it has three principal effects of economic loss, injury to health, and nuisance, occurring singly or together, each problem is unique. Variations in meteorology, geography, industry and populations impede the projection of known results from one area to another. He advocated the establishment of a coordinating agency to act as a clearinghouse and to evaluate results.

Air pollution literature, he continued, is too scattered to keep abreast of all new developments. He recommended a reduced number of published journals in the field and a medium for providing an abstract service.

As a brighter aspect of the air contamination problem, he cited

public health
in transition



TASKS FOR TOMORROW

Expansion of medical and public health research . . .

Extension and broadening of health services . . .

More health personnel effectively distributed . . .

Better health for the world's millions . . .

progress in analysis methods, resulting in more valid information about the nature of contaminants. He also called attention to advances in the agricultural phase of the problem, reporting investigations of the action of many chemicals on vegetables and livestock.

Dr. Williams felt that air pollution legislation is complicated by the fact that contamination does not stay within local, State, or even international boundaries. Many codes and ordinances prohibit atmospheric contamination in varying degrees, he said, but if some of them were enforced there would be no air pollution problem and probably very little industry. He felt that the lack of information both as to contamination measurement and the actual hazard involved stymies the formulation of practical control laws.

"Unfortunately laws are going to be necessary," he concluded. "We can only hope that the urgency of the problem will not result in bad legislation."

Sanitation Experts Help American Indians

Teams of sanitation experts are helping the American Indians to live in an environment of twentieth century sanitation, according to H. Norman Old, sanitary engineer consultant, branch of health, Bureau of Indian Affairs, Department of the Interior. The tribes have been 50 years behind in using sanitation sciences, he said, adding that a lack of public health services may be responsible.

Mr. Old portrayed a statistical picture of the American Indians' plight: The annual income of a Navajo family is less than \$400; among the Papagos of the Southwest, 25 percent of the infants born each year die within 12 months, and only 48 percent survive to the age of 18. Tuberculosis has a high incidence among all tribes.

The Indians' deplorable living conditions are due to many factors—

poor economic conditions, inadequate educational facilities, illiteracy with respect to the English language, failure to have public health education and sanitation services, and lack of organization among the numerous tribes, Mr. Old indicated. But he called for environmental improvements without awaiting the elevation of the economic status and the needed educational reforms.

A new program is under way, Mr. Old explained. Sanitary engineers, sanitarians, and public health nurses are struggling with the problems of adequate and safe domestic water supplies, excreta disposal, insect and rodent control, food sanitation, and suitable housing. Twelve young men from reservations in the greatest need of sanitation services were selected, in collaboration with the tribal councils, for training as sanitarians among their own people. At Phoenix, Ariz., they received 8 weeks of intensive training in sanitary science by the training division of the Public Health Service Communicable Disease Center. State sanitary engineers and laboratory staffs in Arizona, New Mexico, South Dakota, North Dakota, Montana, and Minnesota are cooperating in demonstration projects. Two public health education specialists are now on duty.

This year the Bureau of Indian Affairs will establish several complete public health units, each with one sanitary engineer and several sanitarians, Mr. Old reported.

Discusses Recognition Of Sanitary Engineers

The full utilization of engineers requires a high quality of engineering training, the establishment of standards high enough to bring acceptance of professional engineering skills by other professions, and initiative action by engineers themselves, asserted W. A. Hardenbergh, editor of *Public Works Magazine*.

"If a man is not an engineer, he should not fill any post requiring en-

gineering skills," Mr. Hardenbergh declared. He felt that an engineer must have completed study at an engineering school and, by suitable experience, have qualified for a license to practice engineering.

In health work, he continued, the health department head generally is not an engineer. But he needs engineering advice in analyzing present and potential problems that should be handled by the engineer, in determining their relative importance, in planning necessary measures, and in fitting this phase of the work into the over-all program. The engineer needs an adequate background for this type of planning and analysis, he said.

He urged State sanitary engineering departments to establish a division of local sanitary engineering, charged with visiting, studying, evaluating, recommending for, and assisting the activities of all local and district health departments employing or needing sanitary engineers.

To promote better community health, he said, sanitary engineers should concentrate on and anticipate the health needs of proposed subdivisions, as well as concentrating on cross-connections, industrial wastes, sewer and water extensions, water quality and new water sources, sewage treatment results, refuse collection and disposal, rodent and insect control, and home sewage disposal.

The sanitary engineer should discuss these problems fully with local health officers, as well as problems of air, shelter, civil defense and disaster planning, said Mr. Hardenbergh. He should offer complete data and recommendations for corrective measures and develop practical working plans for each.

However, Mr. Hardenbergh continued, by using the most effective methods of attack, visualizing his organization and procedures, and being able to direct the work, the engineer can demonstrate the practicability of his proposals within the limitations of available personnel and financial resources.

Standard Methods for Examination Of Dairy Products

The growing popularity of shipping milk by tank truck has presented a new challenge to milk control officials. Other developments in milk control presented to the APHA Subcommittee on Standard Methods for the Examination of Dairy Products included a recommended coliform standard count for ice cream, an adjustment in the quantity of yeast extract for the standard methods plate count of milk, and an evaluation of the direct microscopic method for determining the bacterial count of milk and cream.

Group Weighs Pro and Con Of Shipping Milk by Tank

Alerting milk control officials to the potentiality that future milk shipments may be made by tank truck—from producing farm to pasteurizing plant—Harold S. Adams, B.S., assistant professor of public health at Indiana University Medical Center, presented a preliminary report on the Committee on Milk Sanitation study of the new transport method. During 1951-52, Mr. Adams was chairman of the 10-member committee which reviewed milk sanitation practices in 27 States and the District of Columbia for the APHA engineering section.

"This system has noteworthy possibilities for improving the sanitary quality of fluid milk," he said. "It is interesting to observe that as methods of commerce and industry change, official agencies must likewise revise and reappraise their

control techniques and procedures," he commented. Now practiced most widely in west coast areas, particularly California, the bulk collection system is rapidly gaining popularity in other sections of the country, he noted.

Pros and Cons

The committee listed these advantages to bulk shipment, Mr. Adams said: Elimination of milk loss by stickage and spillage in and from milk cans; elimination of the repair and replacement of milk cans and of the hard labor necessary with the can system; improvement in milk quality because of the more rapid cooling of milk by the bulk method than by can.

Other advantages were noted: The can no longer is a possible contributor to high bacteria count. Milk producers like selling their milk in their own milk houses and can watch the sampling on their own premises. There is less misunderstanding over butterfat tests and bacterial count results.

Another advantage is that the milk company will give more attention to farm sanitation practices because rejecting a tank load is much more critical than rejecting a few cans. In California, for example, Mr. Adams said, a tanker with milk from several producers is considered a single lot at its destination. If the product is not satisfactory, the entire lot is degraded and the receiving plant or purchaser must stand the loss.

Disadvantages of the system were also noted:

From the viewpoint of the control official, more time and travel may be expended collecting milk samples. If samples from individual producers are collected, the sanitarian must

precede the tanker or ride on the truck. In the same time period, samples of milk from many more shippers can be obtained from cans at the plant receiving platform.

The system is generally practical only among producers with sufficient volume to justify installation of costly farm milk cooling and storage tanks.

Sanitation problems can arise if the tank driver is careless in handling milk transport hose or pipe and connections, or if the producer has been careless in his tank and equipment cleaning and sanitizing job.

Unless the milk company employs a well-trained hauler with prior experience in judging milk flavor or odor, milk of "off" flavor might be mixed with the milk of other producers to the detriment of the entire load.

Reports on Experiments With Milk-Free Media

To secure uniformity of results in different milk control laboratories, a dehydrated yeast extract culture medium should be used, Leon Buchbinder, Ph.D., assistant director, bureau of laboratories, New York City Department of Health, suggested in describing his latest study for the Subcommittee on Standard Methods for the Examination of Dairy Products.

Dr. Buchbinder was assisted in the study by Miss Yetta Baris, and Miss Leah Goldstein, bureau of laboratories, New York City Department of Health.

Having noted in earlier studies the relationship of the productivity of a given medium to the quantity of ingredients used, Dr. Buchbinder and his associates sought in the current study to adjust the quantity of the yeast extract used in the APHA standard methods plate count of milk closer to the present Difco standard methods T. G. E. M. medium it will replace.

Experiments were conducted with dehydrated and laboratory-prepared media on pasteurized and raw milk, and with varying concentrations of yeast extract. Comparing four different yeast concentrations in percentages of 0.35, 0.3, 0.25, and 0.20, they found that the Difco Laboratory milk-free dehydrated medium containing 0.25 percent yeast extract, 0.5 percent tryptone, 0.1 percent dextrose, and 1.5 percent agar approximated the productivity of standard methods T. G. E. M. agar more closely than the same medium with greater yeast extract concentrations.

"The concentration of yeast extract seems to be much more critical for bacteria in pasteurized milk than in raw milk," they reported. The difference was attributed to the "fact that pasteurized milk, unlike raw milk, contains bacteria which are injured but not destroyed during pasteurization and which grow in the presence of accessory food substances supplied by the yeast."

The study also assessed a new milk-free dehydrated medium prepared by the Baltimore Biological Laboratory and found it to be an adequate substitute for T. G. E. M. agar. It contains 0.9 percent milk-protein hydrolysate, 0.1 percent dextrose, and 1.5 percent agar.

Coliform Count Standard Urged for Ice Cream

Because coliform organisms in frozen desserts reveal poor sanitary practice, Leon Buchbinder, Ph.D., assistant director of the bureau of laboratories, New York City Department of Health, recommended revision of the APHA manual "Standard Methods for Examination of Dairy Products" to include a coliform standard for ice cream. At present, it only gives directions for coliform tests, he said.

Dr. Buchbinder spoke as chairman of the subcommittee for the exam-

ination of frozen desserts. He presented the findings of a collaborative study, in which United States and Canadian laboratories and dairy firms participated, to the APHA Subcommittee on Standard Methods for the Examination of Dairy Products.

The subcommittee's findings could be used as a basis for coliform standards, Dr. Buchbinder pointed out. "The present study afforded the opportunity to analyze a group of data assembled from localities distributed over this country," he said, attributing the lack of a standard to the lack of assembled data.

The subcommittee suggested a coliform standard count be set for ice cream "in the region of 10 per ml. with a provision that three of every four samples comply." Of the samples studied, 70 percent revealed a count of 10 coliform organisms or less per milliliter.

Reports on Methods

In its search for the best method of coliform analysis, the research group weighed unmelted ice cream and melted ice cream and compared the yield of organisms from each method. Analyses were also made for flavor, laboratory location, season, and culture medium. Their findings suggest that the coliform counts in ice cream are higher than those in pasteurized milk.

Six conclusions were reached:

Unmelted rather than melted ice cream is preferred for analysis. The use of undiluted ice cream was not satisfactory. The validity of coliform analysis is related to the volume analyzed; the largest quantity tested, 2 gms., gave the highest count. Sodium desoxycholate agar, the one solid medium used, gave significantly higher coliform estimates than did the one liquid medium, brilliant green bile lactose broth. Under conditions of the study, neither season of year, flavor of product, nor type of laboratory seemed to influ-

ence the number of coliforms in ice cream.

Other subcommittee members included Walter C. Bartsch, chief chemist and bacteriologist, Pioneer Ice Cream Division, Borden Co., New York City; and W. A. Cordes, National Dairy Products Co. Leo Habel, records and statistics, New York City Department of Health, performed the statistical analysis.

Stains Used in Milk Tests Rated for Efficiency

In a report on the comparative efficiency of six suggested stains for use in the direct microscopic method of determining the bacterial content of milk and cream, Nathan Mantel, B.S., of the National Institutes of Health of the Public Health Service, said that three of the stains were superior and of almost equal quality, one was slightly but significantly inferior, and two were substantially inferior.

A total of 8,352 films had to be counted in the 1951 DMC stain comparison study to obtain replicate bacterial counts from 25 samples each of raw and pasteurized milk and 4 each of raw and pasteurized cream for duplicate counts of the 6 stains by 12 participating laboratories, he said.

A completed report form for each slide counted was sent by the laboratories to Mr. Mantel for statistical analysis. The stains with the highest rank were North's aniline oil methylene blue stain, the acid, water-free methylene blue stain of Levine and Black, and the polychrome methylene blue stain of Anderson, Moehring, and Gunderson. If the average productivity of these three stains is taken as 100, then Borman's experimental stain would score 95, the Newman-Lampert No. 2 stain, 80, and Breed's 23 percent alcoholic methylene blue stain, 75, Mr. Mantel reported.

New Methods in Examination Of Water and Sewage

The following facts, among others, were reported in APHA papers dealing with laboratory and engineering aspects of water and sewage:

Progress is being made toward development of standards for rural sewage disposal systems, and better information is becoming available as to the status of present research—with one such project indicating the suitability of an activated sludge plant for an individual home.

Some of the stricter bacterial quality requirements for natural bathing water could be relaxed without detrimental effects on the health of bathers.

A new refinement in procedures for measuring the coliform population of water samples, and a new method for detecting enterococci in water are reported. Water chemists favor a new method for testing water hardness.

Sewage Disposal Systems Studied for Standards

Presenting the first report of the APHA Committee on Rural Sanitation, its chairman, John E. Kiker, Jr., M.C.E., professor of civil engineering, University of Florida, said the 1951-52 objective had been to gather factual information about progress and status of research on rural sewage disposal systems prior to establishing acceptable standards of design as its next project. Studies by health departments

and university groups are now under way.

Preparatory to the drafting of standards, the committee invited constructive assistance from persons experienced in percolation testing of soil and in supervising subsurface disposal systems. The highlights of the committee report follow:

About half of the homes built today are dependent for their sewage disposal on septic tanks and tile fields.

Where the soil is suitable, and the systems are properly designed, the septic tank-tile field method is satisfactory. It is the best available substitute for municipal sewerage and sewage treatment facilities, but it will not work satisfactorily in areas where the ground water table is high and soil conditions unfavorable. Neither will it work for very long unless the sewage is properly conditioned for subsurface disposal—a function of the septic tank, which must be properly designed for the purpose.

Septic Tanks

Present studies favor a two-compartment septic tank, either of equal compartments or with about two-thirds of the total capacity in the first compartment. It should not be inferred that a well-designed single compartment tank of ample capacity will not give good performance. None of the results to date justify a radical departure from present health department practice. Unless changes would have a marked advantage over present practices, they would only serve to confuse the average builder and add to the worries of the already overburdened sanitarian.

Capacity of septic tanks should be increased by 50 percent when home garbage grinders are used. Absorption fields should be increased by an

equal amount to allow for an increased tendency of sewage containing ground garbage to cause clogging of the soil. There is no evidence that absorption field areas need be increased because of household detergents.

Results of research to date indicate that multiple percolation tests should always be made to determine the absorption characteristics of soil in which tile fields are to be placed. Tests should be continued until soil is saturated and percolation rates are consistent. Standardization and agreement are needed on the size of test holes because of the wide variation in water consumption, but there is doubt as to the feasibility of meticulous refinements of the percolation tests.

Sewage Disposal Plant Can Be Used in Home

A small activated sludge plant has been demonstrated to be suitable for sewage disposal in individual homes, reported Don E. Bloodgood, C.E., professor of sanitary engineering, Purdue University.

Recognizing the need for improved single-home sewage disposal facilities, particularly in rural areas, he explained, a research project was carried out at Purdue University to determine whether the aerobic process might be feasible. The quality of the effluent and the quantity of sludge produced were two of the factors investigated.

Testing was divided into three periods. During the first—399 days—a grinder toilet, compressed air aeration, and fresh water for flushing were used. During the second—100 days—the grinder toilet was replaced with a standard flush toilet. During the third—137 days—a grinder toilet was again used; the effluent, however, was recirculated for toilet flushing, and aeration was accomplished either by compressed air or by admission of air into the recirculation pump suction or discharge.

Treatment Unit

The treatment unit, Mr. Bloodgood stated, was a 227-gallon rectangular metal tank divided into an aeration and a settling compartment. Compressed air was supplied by a diaphragm compressor designed for spraying paint and was applied through a standard carborundum diffuser tube. During the first and second testing periods, the effluent was removed from the sedimentation compartment by a weir made of a split 4-inch pipe and discharged to a floor drain. When the grinder toilet was used, the sewer line leading to the treatment tank was a 1-inch galvanized iron pipe; for the standard toilet, it was a 4-inch pipe.

He reported in detail the data collected on the number of usages, water consumption per use, toilet paper used, pH of the aeration tank, dissolved oxygen, and suspended solids and BOD of the effluent. The mixed liquor solids were not removed until the end of the first month of the second period, when the concentration had built up to 12,000 ppm, he said. At this time, 17 gallons of sludge were siphoned into 10-gallon containers, which remained in the basement where the tank was located. Never at any time did offensive odors develop in the system, Mr. Bloodgood noted.

Small Plant Feasible

From this study, he concluded that:

A small activated sludge plant can be made to operate continuously without odors for 399 days with the production of a satisfactory effluent and without removal of any solids except those going out in the effluent.

Although the minimum size for a tank to serve a family has not been determined, the indications are that a 227-gallon tank is large enough for a family of three.

Grinding the fecal matter and toilet paper is necessary prior to discharge to the aeration unit.

The effluent can be recirculated for toilet flushing without harming the process.

Controls Could Be Relaxed On Bathing Water Quality

"Admitting the difficulties of conducting studies in which nature rather than man controls many of the variables, sufficient evidence is available to indicate that some of the strictest bacterial quality requirements for natural bathing water now existent might be relaxed without significant detrimental effect on the health of the bathers," declared Albert H. Stevenson, M.S.

Mr. Stevenson, deputy officer in charge, Environmental Health Center, Public Health Service, reported on three studies of natural bathing waters and the population groups using them.

The studies, he said, were conducted on (1) two Chicago beaches on Lake Michigan; (2) the Ohio River at Dayton, Ky., and a fresh water recirculation pool in the same area; and (3) the beaches at New Rochelle and Mamaroneck, N. Y., on Long Island Sound. Families in these areas were furnished a calendar record form on which they recorded daily swimming and illness experience. Water quality determinations were made on samples collected from the selected swimming areas at intervals necessary to observe significant fluctuations.

Illness Incidence

Mr. Stevenson, summarizing the results of these studies, pointed out that:

In virtually every instance the illness incidence among swimmers was higher than that among nonswimmers (those not going swimming during the study), an expected finding inasmuch as water is an abnormal habitat for man regardless of its bacterial quality.

In the comparison of illness incidence among swimmers with that among nonswimmers, no significant correlation was observed which could be attributed to swimming in natural waters of different quality at the areas studied.

Illness incidence among swimmers under 10 years of age was some 100 percent higher than for those over 10 years of age.

More than half of the illnesses among swimmers were eye, ear, nose, and throat ailments; about one-fifth were gastrointestinal disturbances; and the remainder were skin irritations and other illnesses.

Specific correlations between illness incidence and bathing in waters of a particular bacterial quality were observed in two instances. In one, a significant increase in illness incidence was observed among swimmers when the water had an average coliform content of 2,300 organisms per 100 ml. over the illness incidence when the average coliform content was 43 per 100 ml. The observed increase could occur as a result of chance but once in 50 trials, Mr. Stevenson said. This evidence, however, should not be taken as conclusive, he warned, since only 3 days were selected for study in each instance.

The second instance of positive correlation was observed in the Ohio River study where it was shown that, despite a relatively low incidence of gastrointestinal disturbances, river swimming water having a median coliform density of 2,700 per 100 ml. appears to have caused a significant increase in such illnesses among swimmers. This result, he noted, must also be treated with great caution because of the small number of cases involved.

Report on Reliability of Coliform MPN Methods

Regardless of cause, variations due to changes in the coliform population of water samples may be accurately measured and the variation due to proper laboratory practice can be measured and controlled by the use of procedures reported by Ralph E. Noble and Marjorie L. Sutherland, Ph.D.

Mr. Noble is the principal filtration bacteriologist of the Chicago Department of Public Works. Dr. Sutherland is a biostatistician with the Illinois Institute of Technology, Chicago. In their studies on reliability of coliform MPN (most probable number) indexes, they combined the standard procedures of statistical analysis variance and the MPN method of estimating coliform population.

Using this method for their calculations, it may be possible for bacteriologists to "have more confidence in their data," they said. They reported that their method makes it possible to check and compare the accuracy of data from different laboratories and that it is also possible to realize that unusual fluctuations in coliform indexes may be due to real causes other than laboratory techniques and to determine the characteristics of the environmental influences which cause these fluctuations.

Methods Used

Using duplicate MPN determinations from the same source is essential to the procedure advocated by the Chicago scientists. Four master samples were collected daily for 25 days, one pair in the morning and one pair in the afternoon, they said.

Questions of accuracy and precision, or "how closely does an MPN approximate the true coliform level of the source," and "how reproducible are the MPN's regardless of their accuracy," must be answered in interpretation of an MPN, the researchers postulated.

As an example, they cited: "Assume the coliform level of a source is 20 per 100 ml. and duplicate MPN's are 17 and 23. A second pair gives 6.8 and 13. The precision is about the same in both cases but the accuracy differs. In the first case the average is identical with the true coliform level, while in the second it is 10 less. Any feature of the method likely to cause a loss or gain of coliform organisms, such as improper storage of samples, would

bias the accuracy of the MPN but might not affect the precision."

In their experiments, a statistical quality control chart for ranges was used to measure the general quality of laboratory technique. They found variation due to laboratory technique to be relatively uniform even though the source population level fluctuated from day to day. Analysis of variance was used to measure the variation characteristic of laboratory replicates from one sample, source replicates, morning and afternoon samples, and samples taken from day to day. They reported that information regarding the variances at these sampling levels can be used as the basis for experimental plans designed to increase the sensitivity of tests in coliform population studies.

New Method Detects Enterococci in Water

A new method for the detection of enterococci in water was presented by Warren Litsky, Ph.D., assistant professor of bacteriology, University of Massachusetts, W. L. Mallmann, Ph.D., professor of bacteriology and public health, Michigan State College, and C. W. Fifield, M.S., Michigan State College.

They explained the two-step procedure as: (1) a presumptive test in a selective enrichment and (2) a confirmatory test in a selective diagnostic medium. The presumptive test is made by planting suitable dilution of the test material in dextrose azide broth (Rothe) for 48 hours at 37° C. Several loopfuls from positive tubes are transplanted to tubes of the new medium, ethyl violet azide broth, which are incubated at 37° C. for 48 hours. Growth in the latter medium is reported as a confirmed positive test for enterococci. *Streptococcus faecalis*, *Streptococcus zymogenes*, *Streptococcus durans*, and *Streptococcus liquefaciens* grow equally well in both media. The media in a series of comparative tests on river water gave a hundred-fold to a thousandfold more entero-

cocci than did either SF broth at 45° C. or Winter-Sandholzer media.

Many Chemists Favor New Water Hardness Test

A great majority of water chemists favor the adoption of some form of the Schwarzenbach method for determining hardness in water as one of the standard tests, according to James E. O'Brien, B.S., senior sanitary chemist, division of laboratories and research, New York State Department of Health.

Mr. O'Brien called the Schwarzenbach method, published in 1940, "vastly superior" to the four methods now listed in the "Standard Methods for the Examination of Water and Sewage." He noted that a committee operating under the American Water Works Association general committee E-5-9 has recently reviewed all the water hardness methods known.

If the committee will recommend either of the Schwarzenbach titrations for inclusion in the 10th edition of Standard Methods is not known, he said, adding that "it is a foregone conclusion" that it will recommend dropping one or more of the methods now listed.

The reagent used in the Schwarzenbach method is the disodium salt of ethylenediaminetetraacetic acid commonly marketed in this country under the trade names Versene or Sequestrene. This chemical is a sequestering agent which holds the calcium and magnesium in solution in a form known as "chelation." "The Schwarzenbach titrations are very precise," the chemist said, "and calcium and magnesium may be determined with a high degree of accuracy provided that certain well-established precautions are observed."

Describing the three known factors which influence the results of this test, he reported that two variations of the original technique have been proposed, both of which have their champions.

School Health Service Trends And Research Studies

Research in school health was the topic of joint sessions of the APHA sections on dental health, food and nutrition, and school health with the American School Health Association. The session heard a report on trends in school health services since 1940, a call for standardizing school health examinations of teachers, a statement that immediate application of preventive measures is a practicable approach to child dental health, a claim that education pays in nutrition, and an account of narcotic problems among adolescents.

Fluoridation Would Help Ease Dental Demands

Immediate application of preventive measures such as fluoridation of public water supplies was urged as a practical approach toward the solution of child dental care problems by George E. Waterman, D.D.S., assistant chief of the Division of Dental Public Health, Public Health Service.

Clinical care alone cannot solve the child dental care problem, Dr. Waterman stated in reporting the preliminary results of a 5-year study completed last year in Richmond, Ind. The study, Dr. Waterman indicated, shows:

There are not enough dentists to care for the backlog of dental defects among the Nation's school children.

Effective work on the part of dental assistants can reduce substantially the workload of dentists.

A vast majority of school children do not get adequate dental care; only 25 percent of those participating in

the program had prior dental attention other than emergency treatment.

The convenience of dental care facilities is a factor in the success of a community dental program.

It takes three to five times as much time and effort to care for the lifetime accumulation of dental needs as it does to cope with these needs on a year-to-year basis.

Timely fillings can save a large percentage of teeth, and adequate care throughout childhood might eliminate most needs for extraction.

The project for care of the Richmond school children in the 16 school clinics was developed by school officials, the Indiana State Board of Health, and the Public Health Service, Dr. Waterman said, stressing that enthusiastic support was given by the local government, the school board, the dental society, and the general public.

Health Services in Schools Show Marked Growth

The number of school systems having health services has increased considerably since 1940, H. F. Kilander, Ph.D., specialist for health education, Office of Education, asserted.

Dr. Kilander reported that:

Ninety-one percent of the school systems in cities with a population of 2,500 and over now have a school health service which includes at least a medical examination and a dental examination.

Physicians are available in 63 percent of the school systems; nurses, in 85 percent; dentists, in 40 percent; dental hygienists, in 16 percent; other health personnel, in 12 percent.

The administrative authority for the school health service program, reported by 2,856 city school systems, is as follows: board of education, 60 percent; board of health, 11 percent; both the boards of education and health, 23 percent; other authority, 6 percent.

The school health service is financed by the board of education in 55 percent of the school systems; by the board of health in 10 percent; by joint financing of the two in 23 percent; and by other authority in 12 percent.

Although the school health program is still predominantly administered and financed by boards of education, there is a slight but definite trend toward joint administration and financing, he said.

Achieve Better Food Habits With Nutrition Education

Given education in nutrition, most elementary school children will form better food habits than eighth graders and high school students, according to Floy Eugenia Whitehead, Sc.D., director of nutrition for the Wheat Flour Institute in Chicago.

Dr. Whitehead referred to the parish-wide diet studies of school children in Ascension Parish, La. These were started in 1944. Records of grades 2 through 11 were used, but no attempt was made to follow the same group of children from year to year, or from grade to grade. All schools in the parish were included.

The speaker reported that an appraisal of food habits made in 1944 revealed the parish school children were not as well fed as they might be. For only 1.6 percent of the pupils could food habits be called "good." Rated "fair" were 59.5 percent. Considered "poor" as to food habits were 38.9 percent.

To illustrate the progressive improvement in diets, Dr. Whitehead presented annual data on the percentage of children with poor diet habits in each grade.

As an example—not more than 5 percent, and often much less, of the youngsters in grades 2, 3, 4, 5, 6, and 7 had faulty diets in 1950. For 1944, in the corresponding grades, the number of children with poor diets ranged between 24 and 44 percent. In the higher grades—8 through 11—the boys and girls with poor diets included between 36 and 49 percent of the students. The percentages varied from grade to grade. But 6 years later, in 1950, the number with poor food habits had dropped to between 6 and 15 percent of the eighth grade and high school students.

Nutrition Education

Nutrition education was planned and put into action by teacher committees who coordinated classroom activities and school lunch programs. Outside assistance came from parish educational leaders and community agencies. Consultants on home economics, health, and education assisted. A full-time nutritionist worked for the first 4 years and returned to evaluate results in 1950-51.

Dr. Whitehead believes that the diet improvements were due to real changes in food habits. "It may be," she remarked, "that during the year children learned which foods were highly protective and that this improvement reflects increased knowledge rather than improved practice."

Consistency in practice was found, however, Dr. Whitehead continued, by comparing diet records with school lunch records. Improvement was indicated by physicians' examinations and by laboratory tests of blood plasma taken from a representative group of high school girls.

The effectiveness of the school nutrition program can be seen in a study Dr. Whitehead mentioned of comparative intakes of food groups. The study, based on standards of recommended dietary allowances, was made in 1947-48 and repeated in 1950-51. It included not only Ascension Parish but nearby St. Martin Parish, where no unusual nu-

trition program had been conducted. Improvement in diets over 1944-50 would be expected as the result of improved economic conditions. Therefore, it was necessary to look at the food habits of children in a comparable situation. Food habits were found to be significantly better in Ascension, yet potential food expenditures were not as high there as in St. Martin during the years of the study.

"If economics alone were the dominant force affecting food habits, one would expect better diets in St. Martin than in Ascension," Dr. Whitehead concluded. "The dominant force affecting improved food in Ascension Parish from 1944-51 was the educational program."

Health of the Teacher Main Factor in Schools

The mental health of the teacher is the most important single factor in the classroom environment, maintained Morey R. Fields, Ed.D., director, bureau of public health education, New York City Department of Health, in his discussion of healthful living in schools.

"The school cannot provide environmental experiences which will contribute to desirable development unless it is staffed with healthy teachers," Dr. Fields stated. "From a negative viewpoint, the unstable teacher exerts such a detrimental impact on children that she should not be allowed to remain in contact with them."

"Effective guidance of children is successful to the degree that it is participated in by teachers with well-adjusted and wholesome personalities," he said, adding that silently, insistently, the dress, carriage, neatness, voice, manner, and habits of the teacher are influencing the lives of the children. No school health impact is likely to be stronger than that of the teacher, for children often learn from daily experience with that teacher.

He listed as other considerations in providing a healthful school environment: position of buildings; size, temperature, humidity, ventilation, lighting, and seating of classrooms; cleanliness; safety of the hallways and stairs; drinking and handwashing facilities; toilet facilities; and sufficient and safe play areas—factors for which standards are available from reliable sources and which can usually be adequately controlled.

"Factors related to human understanding, however, will not respond to laws, sanitary codes, or the architect's drawing boards," he emphasized. "Here, controls are personal, from the mind and the heart," he concluded pointing to areas of bigotry and prejudice permitted to be taught in many schoolrooms.

Adolescent Drug Users Ignorant of Dangers

New York City adolescent drug users in 1950 knew how and where to obtain drugs but were "woefully ignorant" of their ill effects, said Harold Jacobziner, M.D., director of the bureau of child health, New York City Department of Health.

Dr. Jacobziner referred to the rise in narcotic usage among the school age population which reached its peak in May 1951. Between September 1950 and February 1952, the city's school health service uncovered 167 cases requiring treatment. These represented about one-fourth of the drug users in the schools, according to Dr. Jacobziner.

The largest number of users was found among the 16-year-olds, he said, and the rate of narcotic usage was much higher in vocational than in academic high schools.

"Though every racial, ethnic, socioeconomic group and creed was represented, there was a marked concentration in critical areas inhabited by individuals or groups subjected to many deprivations and discriminations, and many came from disrupted and disharmonious homes," he noted.

Narcotic users are in part the products of an unhealthy and unhappy environment so that total treatment of addiction calls for understanding the underlying causes and motivations of addiction, he said. Total treatment, he indicated, would not be limited to medical treatment and follow-up but should aim at the rehabilitation and re-education of the user in a drug-free environment, with full preparation for his return to his former environment. One effective way of preventing the psychological ills leading to addiction lies in a comprehensive program of slum clearance, good sanitation, good nutrition, good housing, and good parent-child relationship, bolstered by a program of good physical and mental health, he added.

Standards Should Replace Examination Variables

Standardized procedures of examining and recording should be developed wherever school health examinations are made by both private and school physicians.

Renée Zindwer, M.D., chief of the bureau of maternal and child health, New Jersey State Health Department, evaluated the method, content, and results of routine health examinations given teachers in the Nashville, Tenn., public schools.

From a survey of 843 Nashville teachers examined by both school and private physicians in 1948, Dr. Zindwer concluded that there were "definite inadequacies in the content of the physical examination," adding that the examining physicians should be informed about the exact purpose and use of the examination and that a close relationship should be maintained with the school service staff.

Annual Examination

Dr. Zindwer suggested that the differences she noted in recording might be due to interpretation—

many private physicians might not have considered corrected vision or artificial dentures to be defects. Some differences might be due to emphasis—for example, school physicians found significantly more emotionally disturbed people, she reported.

Nashville teachers must have a medical examination every summer. Teachers under civil service may be examined at their own expense by a private physician or without cost by the school physician. Teachers not having civil service status must be examined by the school physician. About two-thirds of all teachers had civil service status in 1948.

Dr. Zindwer remarked that "although two-thirds of the teachers had the privilege of choosing their private physician for the examination, only one-fifth actually did so." One motivating factor, she suggested, was expense, "particularly among the older teachers." Many of these still considered the examination as something to submit to exclusively for the convenience of the board of education without recognizing the intrinsic value to themselves. In other instances, she noted, "the examination by a school physician was preferred because of friendly relationships and because the teachers liked to discuss their health problems with the school doctor."

Examination Items

Medical and related information was grouped around 17 items on the routine examination, to include:

Eyes, dental, obesity, cardiovascular, respiratory, orthopedic, gastrointestinal, genitourinary, fractures, major surgery, minor surgery, emotional, tumors, miscellaneous, multiple findings, free, recommendations.

Some of the items, according to Dr. Zindwer, included actual defects predominant at the time of the examination; others were weighted with items of medical history. "Miscellaneous" included a variety of findings not falling into the examination grouping, as—history of dia-

betes, rheumatic fever, allergy, or of multiple miscarriages. For all ages, 12.5 percent of the 843 teachers examined were found to be "free"—without any significant history of disease and showing no defect.

Sex distribution of findings indicated that women had significantly more eye defects, cardiovascular difficulties, operations, and multiple findings than the men teachers, Dr. Zindwer said.

To compare the findings of school physicians and private physicians, Dr. Zindwer explained, "we considered only the teachers with civil service status in order to have a more homogeneous group. Of the 562 people in this category, 148 were examined by private physicians and 414 by school physicians."

Emotional Disturbances

"The higher incidence of eye defects, dental defects, orthopedic problems, and miscellaneous findings as well as of recommendations noted among those examined by school physicians," she continued, "was highly significant and so was the fact that the group examined by private physicians had about three times as many people free from defects or pertinent history as those examined by school doctors. The private physicians also found significantly less emotional difficulties. Altogether, the private physicians' records showed 1.7 positive findings per person, whereas the school physicians noted 2.6 findings per person."

Dr. Zindwer urged that consultant services and special examinations be made available when the routine examination indicates the need for further studies, and that more attention be given to the "importance of detecting and evaluating" emotional disturbances among teachers than is possible through a routine health examination. "We must find a practical method for screening such cases and referring them to specialists for further study and recommendations," she stated.

Studies and Programs In Dental Public Health

Several facets of dental public health received consideration at meetings of the dental health section. The dental care program in New York for the rehabilitation of children physically handicapped; a public program in Rhode Island supported by a private institution, government agencies, and private endowment; the patient-dentist relationship; and the improvement of the status of dental public health were among the topics discussed.

New York Dental Program Treats Malocclusions

Administering the dental rehabilitation program for handicapped children in New York State still presents problems, even after the establishment of apparently sound procedures, observed Arthur Bushel, D.D.S., M.P.H., and David B. Ast, D.D.S., M.P.H., assistant director and director, respectively, of the bureau of dental health, New York State Health Department.

"There is the occasional orthodontist who does not agree with the department's decision as to eligibility of a case, the rejected applicant who feels he is being discriminated against in his request for inclusion in the specialist roster, the judge who suddenly cuts off funds so that even cases which have been under treatment are not approved for essential, continued care. There's the occasional study model broken in shipment, and the child who proves completely uncooperative and for whom care must be discontinued," they said.

One indication of success, they reported, is that almost every qualified orthodontist in upstate New York has asked to participate. The cur-

rent roster of approved orthodontists includes 100 in New York City and 98 in upstate New York. The current caseload of about 1,500 for the entire State represents rapid expansion of the program. Applicants in upstate New York rose from 51 in 1946 to 442 for the first half of 1952, and 54 percent of the upstate cases reviewed in that period were approved for rehabilitation.

Procedures

Continuing their description of the program, they reported that:

Although physically handicapping malocclusion came within the legal provisions of the State aid rehabilitation program, it wasn't until 1945 that a separate orthodontic care program for children was initiated under the bureau of dental health. An advisory committee was appointed to determine, among other functions, fee scales, qualifications of orthodontists, and classification of handicapping malocclusions.

The committee early realized that it could not be too precise in defining handicapping malocclusions because of the infinite number of variations possible and because of the difficulty in evaluating the psychological and physical factors which create a physical handicap. Drs. Bushel and Ast explained. Despite these difficulties, it established the following classifications of malocclusion as to a guide to eligibility:

1. Malocclusions associated with cleft palate, cleft lip, or ankylosis of the temporomandibular articulation.

2. Malocclusions resulting from severe structural deformities involving growth and development of the mandible and/or maxillae: prognathism, retrusion, micro- or macrodevelopment of the jaws.

3. Severe malocclusions resulting from disease or trauma of the mandible and/or maxillae.

4. Malocclusions resulting in disfigurement or speech defects which may present a serious obstacle to normal development, education, and employment of the patient in later life.

Alerted case finders refer detected cases to the local health officer who authorizes consultation with any licensed dentist of the parents' choice. If the case qualifies for rehabilitation, the dentist sends the required diagnostic aids—mounted dental X-rays, full set of study casts, and profile and full-face photographs—along with his written report to the dental bureau for review.

Fees

Under existing State law, the children's courts determine the degree of financial eligibility of applicants for rehabilitation. The State health department has jurisdiction over all professional phases of the program. The county and the State each contributes 50 percent for that part of the care borne by public funds. The local health officer assists the parents in petitioning the children's court for care. Care may be provided only by orthodontic specialists on the health department's roster. No more than 1 year of treatment may be authorized at a time, but up to 3 years may be approved. Usually more than 1 year of treatment is required—the average has been 1.9 years, they reported.

The maximum fee for the first year's treatment is \$300 for service in the orthodontist's office, or \$200 at an approved clinic. Near the end of a year's treatment, the orthodontist submits a progress report to aid the courts in determining if continued care is to be ordered. The maximum fee for each of the second and third years is \$200 for private orthodontists and \$120 for approved clinics. Additional retention care is available at not more than \$5 a visit for a maximum of 12 visits. In all, a maximum of \$700 may be approved for active treatment.

In 1951, 1,105 children received care costing \$246,673 at an average cost of \$223.

Extent of Program

Some of the malocclusion cases require other services such as fillings, extractions, dentures, and obturators, for complete rehabilitation of the mouth. Speech therapy, particularly for cleft palate cases, is obtainable. Children requiring full dentures, extensive partial dentures, or other extraordinary dental service to correct a physical handicap are eligible under the program. The Veterans Administration fee scale is the guide for such general dental services, and any State-licensed dentist is eligible.

It is apparent, Drs. Bushel and Ast believe, that orthodontists serving under the program are "extremely conscientious and certainly are not attempting to prolong the period of care."

Facial Orthometer Is Used To Assess Malocclusions

The facial orthometer, an instrument devised to measure quantitatively the dentofacial morphology of population groups, was recommended as an epidemiological tool for the study of malocclusions by Walter J. Pelton, D.D.S., chief, Division of Dental Resources, Public Health Service, and William A. Elsasser, D.D.S., a member of the division's staff.

This instrument, they said, permits accurate classification, measurement, and controlled experimentation. It may be used to establish the "ideal" dentofacial pattern and also to detect the various deviations from this pattern.

They explained that the term "ideal" is used for the theoretical face whose dentofacial index (DFI) would not only be 0 but whose every measurement would be exactly the same as the standard average for each measurement taken. "Normal" represents the face whose measurements fall within a standard range of the "ideal."

Dentofacial Index

The dentofacial index, they stated, consists of the summation of the weighting of seven separate components. It is thus an expression of the additive effect of several individual variables. To establish the orthometric standard of "norm," the mean and standard deviation for each of five components were determined by observations on 93 "normal" white children, aged 6 through 12 years.

The components which make up the index make possible a quantitative method of classifying malocclusions, they stated. The index provides a useful measuring device suitable for studies of the epidemiology of dentofacial deformities.

When investigations of the incidence and prevalence of malocclusion are carried out on a wide enough scale, a valid concept of the nature and extent of the aberration will be had for the first time, they said. Only through such studies can knowledge be gained as to the effect of various environmental influences on malocclusions.

Finally, they stated, the dentofacial index lends itself readily to use for basic studies of the effects of growth and development upon the face as well as for measuring the changes brought about by treatment.

Combined Resources Used In Dental Care Program

A program for dental care of children combining the resources of separate but cooperating organizations—a private institution, agencies of Federal, State, and local governments, and private endowment, was described by Alfred F. Morin, D.M.D., the director of the Joseph Samuels Dental Clinic, Rhode Island Hospital, Providence.

The Rhode Island Hospital, a private institution, supplies the physical accommodations for treatment, Dr. Morin said. The cost of dental care

is divided among the patients, the deficit being absorbed by the hospital and the clinic endowment fund. As a result many receive proper treatment without the stigma of having been forced to accept charity.

This subsidized plan, offering families of moderate means dental treatment for their children at small fees, is one phase of the program, Dr. Morin stated. A second phase is the treatment of preschool-age children and education of their parents in the importance of dental health, with funds provided by Federal and State agencies on a fixed cost per visit basis. Provision for dental care of children on welfare rolls is a third phase of the program, financed by city welfare departments, the clinic endowment fund, and the hospital.

The Joseph Samuels Dental Clinic, founded in 1930, in addition to providing community services, has become a center for training dentists in the care of the child population of Rhode Island. Although the program is not the panacea for all dental problems, Dr. Morin believes that dental treatment for children approached from a group basis and formulated into one program with maximum use of existing facilities benefits all participants.

Sociodramas Can Show Stresses of Dental Patients

An understanding of emotional factors, acquired through "role-playing" devices, may help public health and private dentists with human relations problems, William G. Hollister, M.D., M.P.H., mental health consultant of the Public Health Service, believes.

Emotional reactions prevent many persons from receiving needed dental care and, at times, block effective development of public dental programs, Dr. Hollister said.

Dentists, he reported, have requested help in understanding "problem patients," in dealing with the

public's general fear of dentistry, and in getting people to accept and follow through on dental procedures.

From field observations, Dr. Hollister found that most dentists are prepared to educate or to convince by argument. But many of them do not understand how to work with the patient on an emotional level, he said.

Dr. Hollister named as the learning goal the comprehension of the way one's own feeling and the other person's feeling affect a relationship. Pertinent psychological knowledge and enactment of experiences, condensed into a brief workshop or trainee course, can provide this understanding, he said. To illustrate, he outlined a course of this type.

Laying the foundation is a lecture and chalk talk which covers briefly the role of emotional growth in personality development, the component parts of personality, and the physiological basis of emotions. From this material the trainee develops a concept of the basic emotional needs of the individual and how these needs motivate and color behavior.

Reveals Feelings of Both

Through a series of role-playing devices, the trainees experience the "feelings" involved in a dentist-patient relationship. A member of the group, in the role of a dentist, silently approaches a "patient" in a dental chair. And the other members of the group portray their reactions to this "dentist." Thus, they become aware that the role-player, without words, has transmitted to them certain feelings. Through discussion, the group can explore how this nonverbal communication of feelings affects the patient's confidence in his dentist, and the professional person is aided in diagnosing the "feeling problem" with which he is confronted.

Similar "experience techniques" are used to study the effect of the patient's expectations on the relationship, how the "counter-feelings" of the dentist toward the patient

complicate his relationships, and the effect of personality qualities, such as a dentist's warmth and noncritical attitude.

Actual problem situations from the dentist's daily work with people are enacted in sociodramas and discussed. Here the dentist gets practice in working with anxiety, fear, and resistance in a patient before he actually meets the situation. He not only works out the "words" needed, but by experience he begins to sense the attitudes in himself that are basic to better relationships with others.

Improved Dental Status Seen in Proposals

A twofold proposal for securing a better understanding of the objectives of dental public health and, incidentally, improvement in the administrative status of dental units in State health departments was offered by W. Philip Phair, D.D.S., M.P.H., assistant secretary of the Council on Dental Health, American Dental Association.

As the first part of the proposal, Dr. Phair suggested several ways in which dental health directors can help promote this understanding: Foster local cooperative arrangements between dentists and other health professions through joint society meetings and community health work; help in teaching courses in dental public health in schools of dentistry, medicine, and public health; participate actively in health department in-service training programs; demonstrate a genuine interest and good knowledge of other aspects of public health work; write their ideas of what a comprehensive dental health program in their area could be and work energetically and systematically toward achieving it; inaugurate convincing demonstration programs; measure and publicize the effectiveness of their activities.

State Conferences

He recommended, as the second part of the proposal, exploring the possibility of State conferences. "In States where the problem seems immediate enough to warrant specific action," he said, "dental societies could sponsor an all-day conference with participants representing dentistry, medicine, and public health within the State. The conference might also be able to obtain assistance from management consultants, schools of public health, representatives from one or more national organizations, such as the American Dental Association, the American Public Health Association, and representatives of the Public Health Service."

Listed as possible objectives of such a conference were these points: Help acquaint participants with dental needs and resources in the State and the present and proposed programs to meet those needs; establish principles which determine the administrative positions of the respective units in the State health department; seek the establishment of an administrative position for the dental units which will be mutually satisfactory to all concerned and which ultimately will result in better dental public health services for the people; define more clearly the points of agreement and disagreement in regard to the administrative status of the dental unit in that particular State health department.

Recognizing that "blind blames on the medical profession are unavailing" in improving the situation, and that "statements and legislation demanding recognition and status, even if granted, are empty," Dr. Phair expressed the belief also that agreements in meetings composed almost wholly of public health dentists are abortive without demonstration of the fact that dental public health can do a job and without a more concentrated effort on the part of public health dentists in helping their colleagues understand what they are trying to do.

Use of Surveys as Yardsticks In Public Health

The community survey, the professional survey, and the staff self-evaluation study as methods of measurement in public health were discussed in a special session of the APHA. Whether the goal is education of a community about its health responsibilities or measurement of the increase or reduction of a specific health problem, the speakers indicated the surveys were satisfactory techniques, but could be improved by the development of better measuring devices.

Defines Survey Factors To Aid Measurement

In order to establish a common basis for the consideration of public health surveys and evaluations, John D. Porterfield, M.D., M.P.H., director of health, Ohio Department of Health, defined some of the factors involved in public health measurements.

Three Factors

"Need," he said, "refers to the lack of something without which good health is difficult or impossible." He explained, however, that need may not be obvious to the public. For the community population there is instead the factor "want." "And woe betide the health expert who insists flatly on the need for preschool immunization programs when the community wants its children vision-tested," he observed.

"The activity engendered either from needs or wants or from a judicious blending of the two is expressed in 'services,'" he continued. He pointed out that there is a vast difference between the amount of serv-

ices performed and the amount received. Counting the number of doorbells pushed is not quite the same as counting the number of family members who have enjoyed a public health nurse's visit, he explained.

A third factor he noted was community "usage," defined as "the community utilization of a service." Usage alone, he said, is not an accurate measurement of need, for if a community does not "want" the services provided, it will not use them.

Types of Surveys

Mentioning briefly the various ways of measuring these different factors, discussed more fully in succeeding papers, he pointed out that the self-survey by the community very often estimates community "needs" from the viewpoint of "wants." This type of survey, though not highly scientific nor a very exact measurement, is, if properly done, a prime educational tool, he stated.

The professional community survey, on the other hand, usually measures "needs," with only a fleeting reference to "wants," he remarked. He called the professional survey indispensable in developing a pertinent program but suggested that the community may not accept the survey, much less its findings, unless its concern has been aroused.

The professional survey may also be used to compare needs with facilities or services, permitting formulation of judgment as to appropriateness or pertinency of programs, he added. This type of investigation may be requested by the health officer, but more often by the community.

Evaluation or appraisal of public health programs may compare the activity done with the service ren-

dered or the service rendered with the results achieved. "Evaluation is an attempt to determine whether the effects achieved are worth the effort expended or to determine the efficiency of the translation of effort into achievement," Dr. Porterfield said.

Professional Surveys Measure Public Health

Directors of local health departments and other health workers are frequently in doubt about the value and effectiveness of their efforts to improve community health and welfare, stated Ira V. Hiscock, Sc.D., professor of public health and chairman, department of public health, Yale University.

Surveys are helpful in evaluating community health problems and in developing plans to meet them, Dr. Hiscock continued. Administrative surveys include study of organizational structure, review of operating methods, and determination of appropriate areas in which to undertake detailed installation programs. A good survey requires skilled and active staff work, he stated.

"Too much emphasis cannot be given to the need for people with competence to secure and interpret more and better facts in order to show more clearly and precisely what communities can do to prevent and control the problems of the individuals and families," Dr. Hiscock maintained.

When the survey is completed, the professional consultant, "without vested interest or bias," can be of special assistance in interpreting the data collected, he concluded.

Self-Surveys Promote Community Health

The community self-survey of health provides a common ground where professional and nonprofes-

sional persons can meet and work out their problems together, stated Paul A. Miller, B.S., extension specialist in rural sociology and anthropology of the Cooperative Extension Service, Michigan State College.

Sound application of public health practice must involve all members of society, and community health surveys help to shift emphasis from the individual to the family and the community. More and more, participation of local residents in public programs, from planning to tabulation of results, is being encouraged, Mr. Miller said. By taking a look at the health environment in which we live, the recipients of public health services are learning to see their problems from the vantage point of their neighbors, public health workers, physicians, political officials, and others in the public health field.

Community self-surveys of health provide opportunity for instruction and practice in rational, logical, and analytical approaches to the solution of problems. Such surveys reeducate the population of the community and provide an atmosphere conducive to acceptance of the facts about health rather than what is believed to be the facts.

Says Measurement Used Depends on Purpose

Summarizing the preceding discussions on measuring public health, Jack C. Haldeman, M.D., assistant chief of the Bureau of State Services, Public Health Service, said:

"A strong case has been made for each of the methods presented: the community-citizen survey, the professional survey by visiting experts, and continuous self-evaluation by the director and staff of operating health agencies as an integral part of program operation. The time and place for each depends upon purpose. If

a community needs to be aroused to action concerning its health responsibilities, the citizen survey, if properly done, appears to be the most effective education tool. If the goal is scientific measurement of the increase or reduction of a particular health problem, or unbiased appraisal of the administrative efficiency of a health department's organization and management, the professional survey by experts would be the chosen technique. At the risk of overgeneralizing or oversimplifying, one might say that the primary advantage of the citizen survey is to get something started—of the professional survey, to refine what is already in operation."

Dr. Haldeman added that for each type of procedure outlined he would like to underscore the importance of obtaining better criteria as devices for measurement.

"Today's leading public health problems, particularly those associated with the chronic diseases, rehabilitation services, an aging population, and a chemical environment, require a wide range of professional competence and a number of complex facilities and services," he said.

"During recent years," he commented, "we have all become increasingly aware that the newer programs do not always fit into the traditional concept for delivery of public health services. Many local health organizations, as they are now constituted, cannot cope with these problems. This does not mean that local health departments should be strengthened and that new administrative techniques must be developed."

"The answer," he stated, "can only be obtained by determining the real public health needs of the present (as determined by what individuals of the community want and as measured by the experts) and through the evaluation of existing practices to find out how effective they are. Then we can move on to find how they can be improved. The validity of such reassessment of our present

practices is dependent upon the measuring devices we use."

Maryland Study Evaluates Program Efficiency

A study for evaluating the effect of conformance to standards of hospital care for premature infants under way in Maryland was described by Rowland V. Rider, Sc.D., moderator of a panel discussion on measurement of program efficiency.

After outlining the general steps in this type of study, Dr. Rider, assistant professor of public health administration, Johns Hopkins University School of Hygiene and Public Health, described the specifics of the Maryland project:

The standards of care being evaluated, about 90 items, were derived from the recommendations of the American Academy of Pediatrics. Information on the items was obtained at the beginning of 1952 for each hospital by two members of the Maryland Health Department, and a recheck of the hospitals will be made at the end of 1952.

Each of the items of care was assigned a score, and over-all ratings were obtained by adding the scores on each item. The hospitals were then divided into three groups according to these ratings. The neonatal survival rate in each of the three groups will be the measure of effectiveness of conformance to the standards.

In addition, personal data will be collected on each birth and used to compute rates specific for certain characteristics, such as race, in order to control the influence that differences in these factors among the groups of hospitals would otherwise have on the comparability of the survival rates.

Factors Influencing Outcome

In the discussion following this presentation, one of the panel participants, Edward R. Schlesinger, M.D., director, bureau of maternal

and child health, New York State Department of Health, discussed the difficulty in setting up adequate controls in evaluative studies of public health programs and in weighing various factors making for selection of cases in such studies.

In addition to the factors pointed out by Dr. Rider which may affect the neonatal survival rate, the inclusion in such a study of premature infants brought into the nursery from outside the hospital raises complications, he said. Such infants have survived the first few hours and would therefore seem to have a better prognosis for survival than premature infants in general. On the other hand, very small premature infants and infants doing poorly for any reason are usually selected for transfer to the special premature infant nursery. How to balance one factor against the other in any given situation is almost an impossibility, he remarked.

Other Evaluation Methods

Dr. Schlesinger emphasized, however, the importance and possibility of program efficiency evaluation even when it is not possible to do well-controlled and carefully developed evaluative studies. Evaluation, he said, has all grades of exactness, and as long as the limitations of any method are understood, each type is helpful in the development and improvement of public health programs.

The simplest type of evaluation is the comparison of services being rendered against some yardstick established by accepted authority, he noted. In this type of evaluation, there is no quantitative element involved except possibly the extent of the services in relation to the size of the population serviced.

Another type of evaluation mentioned by Dr. Schlesinger was the measurement of accomplishment against previously established objectives. More quantitative, however, is the measurement defined in mortality or morbidity but without any control, he added.

Every society, every community has its quota of those who are handicapped. And modern societies and progressive communities are ever seeking better ways of helping the handicapped to overcome their problems, particularly children, whose problems are still in the formative stage and are therefore more easily resolved.

No matter what the impairment may be—epilepsy, hearing or speech difficulties, or various orthopedic and neurological handicaps—the crippled child can be and is being helped by both public and private agencies. How this help is being effected and appraisals of its success were reported to the APHA, to the National Society for the Prevention of Blindness, and the American School Health Association.

Mistletoe of Yesteryear Gives Way to Mysoline

Since the days when epileptics drank blood of gladiators in the Roman arena and the doctors prescribed mistletoe collected from the oak at new moon, we have come a long, long way in the treatment of epilepsy. This, Ruth Baldwin, M.D., and associates reported in discussing the epilepsy program in public health. The use of the encephalograph in detecting cases, surgery in correcting, and the use of new preparations, such as mysoline, in controlling seizures, give further promise.

Ten characteristics of epilepsy were listed and examined by Dr. Baldwin, pediatric department, Uni-

versity of Maryland Medical School, and her associates, Edward Davens, M.D., chief, bureau of preventive medicine, Maryland State Department of Health, and Virginia Goddard Harris, M.D., pediatric consultant, bureau of maternal and child health of the department of health. These characteristics suggest that the control of epilepsy is a public health problem of high order:

A chronic disease—A lifetime affliction, epilepsy shares with other chronic ailments the problems and costs of securing competent and continuous service.

The wide prevalence—Approximately 1 out of every 200 persons has the disease in some form.

A disease of childhood—Early case finding and provision for adequate treatment are preventive measures of inestimable value.

Few specialized personnel—And these few are located in large medical centers.

The danger of false labeling—Exact diagnosis is difficult without opinions of several specialists and the use of many tests.

The fog of secrecy—This can be dispelled only through public enlightenment.

The need for education of the public—The health department best can spearhead the attack on fantastic misconceptions and shame which surround the disease.

The difficulty in job placement—More than 75 percent of all epileptics are fully employable. In Illinois, 52 percent of 1,450 epileptics have been placed in full-time employment and disposition is pending in 22 percent, leaving only 26 percent in which the outcome is reported as definitely unfavorable.

The staggering cost to society—Assuming that 1 in 10 of the 200,000 epileptics under 21 years of age in

the United States could become self-supporting, the cumulative economic contribution by these restored persons during their working years, whether in earnings or services, would approximate one billion dollars, and a like amount could be duplicated in each generation.

The urgent need for research and training—The singular contrast between the huge annual cost to society and the negligible amounts spent on research and training points up the urgent need for more centers such as the seizure unit of the Children's Medical Center of Boston where a total care program for hundreds of patients annually is carried out along with research and training.

The Maryland Program

What Maryland is doing to combat epilepsy, through its division of crippled children in cooperation with the medical schools, was outlined by the physicians. Regionalization of the State is materialized by dividing the counties to be served between the University of Maryland clinic and the clinic of Johns Hopkins University. A series of regularly scheduled consultation clinics staffed by physicians from the two centers is conducted in 17 of the 23 counties of Maryland. The major aspects of the program are:

Diagnosis and treatment to all from birth to 21 years of age. Observing priority of emphasis, the program has been directed to the large group of children with convulsive seizures—approximately 80 percent—who are readily amenable to treatment and who do not require institutional or custodial care. Approximately 526 children were examined in addition to a number of adults. These children made 1,102 clinic visits during the year. Of the total number, 212 or 40 percent, were brought in to the central diagnostic-regulatory centers for initial definitive work-up and regulation.

Promotion of public understanding that will bring action through coordination with all other public health services—school health, voca-

tional rehabilitation, citizens' groups such as mental hygiene societies, and crippled children's programs.

Among many case histories cited in the report was one illustrating the part played by psychiatric consultation in arriving at accurate diagnosis and in curing simulated epilepsy. Interviews with the child's parents, who were divorced and remarried, indicated the child was simulating seizures she had witnessed in others. Excellent adjustment followed treatment and placement in a foster home.

Delaware Agencies Unite To Aid Speech, Hearing

An interlocking program to correct the speech and hearing defects of preschool- and school-age children unites Delaware's State Board of Health with the Delaware Hospital and two school systems in a common service, Jack Sabloff, M.D., and L. Leroy Horne, M.A., told the joint session of the maternal and child health section and the American School Health Association.

Dr. Sabloff and Mr. Horne are directors, respectively, of the division of maternal and child health and crippled children's services in the Delaware State Board of Health, and of the Delaware Hospital audiology and speech center, Wilmington.

Workable procedures and a clear-cut understanding of each agency's and individual's part in the program are essential to its smooth running, they said. They described the program as follows:

Schools

Delaware has two public education systems, one in the State and the other in the city of Wilmington. The city, in 1943, initiated a speech correction and reading program which, with a staff of four speech correctionists, a speech reading teacher, and a teacher of the deaf, serves 12,000 children. All other schools except parochial schools are served by the State's

speech and hearing program. Its supervisor of special education and six speech correctionists are responsible for the speech problems of school-age children.

The two systems act for the health department as case-finding agencies, relying on the teacher-nurse relationship. Any child suspected of impaired hearing because of speech deviation, inattention, or history of ear infection is brought to the attention of the speech correctionist for a pure-tone audiometric test. If correction is indicated, he is referred to the State board of health for complete audiologic and otologic evaluation. The family physician is notified of the referral by the school nurse.

Board of Health

The State board of health employed a speech therapist for cerebral palsied children in 1946. Children with cleft palates and others with functional speech disorders were later included in the nucleus of a speech program stressing services for preschool youngsters. As speech problems related to hearing impairments were encountered, the program was expanded to include hearing. A coordinator of speech and hearing, three additional therapists, and an audiologist compose the staff. Diagnostic services and speech therapy are available. Almost all cerebral palsy cases and most cleft palate cases are referred by the schools to the health board. The staff conducts therapy at scattered county health units.

Children are referred to the Delaware Hospital audiology and speech center for otologic and audiologic evaluation and for such recommended treatment at the hospital as tonsillectomy, adenoidectomy, and radium and X-ray therapy. When auditory training, language, and speech rehabilitation are indicated, the board of health utilizes the audiology and speech center for Wilmington children. Children in other parts of the State are trained by its own staff audiologists.

Audiology Center

In 1949, Delaware Hospital started a department of audiology and speech and an audiology center, equipped by the State board of health. The hospital arranged for the center's construction and agreed to support the center and its staff, which is directed by a member of the hospital's department of otolaryngology. The health board set fees and in-patient hospital rates with the hospital. The center's hearing services were expanded in July 1951 to include all speech deviations.

Equipment includes a modern speech-hearing evaluator and an electronic device for psychogalvanic skin resistance testing. Diagnostic audiometric tests and speech-hearing threshold and discrimination testing are performed. Speech and reading therapy, auditory training, counseling, and mental hygiene round out the complete rehabilitation services available. Hearing aids are scientifically selected and evaluated. Complete otolaryngological examinations and treatment and surgical services are provided for health board referrals by the hospital-assigned otologist. The center is staffed by two persons professionally trained in audiology and speech pathology.

Training an Essential In Hearing Programs

Two pitfalls that a public health program for speech and hearing must avoid were noted by Leo G. Doerfler, Ph.D., associate professor of audiology, University of Pittsburgh School of Medicine.

Dr. Doerfler said too much emphasis may be placed upon diagnostic work and sufficient provisions may not be made for adequate follow-up and training. It is not enough, he declared, to demonstrate that the small amount of hearing still remaining in a hearing-handicapped child of

preschool age, for example, can be utilized to pay later dividends psychologically, educationally, and vocationally. If the program does not provide facilities and trained teachers to take advantage of this fact, little has been gained.

Diagnosis involves differential diagnosis of children who do not respond adequately to sound, he continued, not to just a hearing test. He suggested the use of many simple toys and tools in addition to the audiometer and, where feasible, newer instruments such as the psychogalvanometer. All special tests require special interpretation, he pointed out. Moreover, there are vital diagnostic facts, such as parent-child relationships, which are not revealed by any machine, he added.

He also urged, as a correlate to this problem of diagnosis, that recommendations for training and education be realistic. Until facilities are improved and enlarged and new ones opened, raising hope that cannot be practically realized does more harm than good, he maintained.

Hearing Tests

At the preschool level, Dr. Doerfler stated, there are reasonably accurate small-group tests which may determine whether or not the child has sufficient hearing to hear and understand normal speech. Recorded speech is usually the test material, and the responses required are actions rather than speech.

The trend in screening tests for school-age children is toward use of pure tones, administered either individually or to small groups, and away from the use of the phonograph audiometer using words or numbers. Pure-tone tests give more information, are more efficient in case finding, and are about equal in terms of time for administration.

Hearing measurement tests listed included the following: audiometric tests, usually for children above 5 years of age; tests, electronically administered, to determine whether

speech is understood; and special tests, including the so-called conditioning tests. The latter group have much to offer, he remarked, especially for testing children under 3 years old, but much is yet to be learned about validation of the various clinical types before the tests can be employed universally.

Ohio Extends Program To Conserve Hearing

A goal of the Ohio Health Department is to test annually 33 percent of the school population for hearing defects," Margot D. Hartmann, M.D., M.P.H., chief of the division of child hygiene, Ohio Department of Health, reported to the joint session with the American School Health Association.

Five years ago audiometric testing was practically unknown in the smaller school systems of Ohio, the speaker said. Although there was only a 7-percent increase in the total number of school children tested from 1947 to 1951, she stressed that pure-tone audiometric tests were given to 87 percent of all tested in 1951 as compared to 38 percent in 1947. The number of counties giving some kind of hearing test increased from 46 to 81 (out of a total of 88), and the number of cities which include a hearing test in school health programs increased from 31 to 65, she stated.

Local Resources

Local resources are the core of the State's demonstration program, the speaker continued. They are used in planning and audiometric testing, and local specialists are used in rural communities wherever possible.

The coordinating agency for local program planning is the division of child hygiene in the State health department, Dr. Hartmann reported. Highly qualified consultants advise local health departments and schools, maintain liaison with other State agencies, universities, and profes-

sional groups, and assist with testing and interpretation at clinics. Locally, the program is centered in the health department, and emphasis is on prevention and education, she reported.

Training of local personnel is supervised by State consultants, or may be a shared responsibility of State consultants and local speech therapists. Testing methods used must conform to established standards.

Value of Clinic

Although the testing program will show whether or not a clinic is needed, the health department usually requests a clinic to demonstrate the value of adequate diagnostic services, Dr. Hartmann said.

Programs are started only on community request, the speaker said; quality of service, not quantity, has been emphasized; hearing conservation programs were encouraged only when local interest and personnel justified it; follow-up of a few children and correction of all defects found was of first concern. Follow-up care of children examined in clinics or referred to the clinic directly is the responsibility of the community, she stated.

Use of Trailer

A trailer which permits all types of audiometric tests, hearing aid evaluation, and speech reception, has been put into operation, Dr. Hartmann stated. It has been used chiefly in mass education at county fairs, the State fair, and meetings of professional and civic groups. About 3,200 persons of all ages were tested at fairs this summer and referred to physicians if they did not pass the test, she reported. The trailer can be used for vision testing.

Ohio provides scholarships to four to six postgraduate students in audiology, Dr. Hartmann said. Scholastic ability and seriousness of purpose are the only requirements for eligibility, she concluded.

Visual Screen Methods Studied in St. Louis

Discussing the organization of a vision testing research program, Marian M. Crane, M.D., chief of the Children's Bureau child development research branch, reported the following:

The study was carried out jointly with the National Society for the Prevention of Blindness, the Children's Bureau of the Federal Security Agency, the Missouri Department of Public Health and Welfare, the St. Louis Board of Education, the department of ophthalmology, Washington University School of Medicine, and the Office of Naval Research, from February 1948 to June 1949.

Aim of Test

The purpose was to determine the efficiency of some of the procedures frequently used for screening elementary school children for visual defects as measured by the success of the procedures in identifying those students found by ophthalmological examination to need eye care.

Subjects were 609 sixth grade students and 606 first grade students in 14 public schools in St. Louis. Each student received a complete ophthalmological examination which included refraction under homatropine cycloplegia. On the basis of the findings one ophthalmologist recorded a clinical judgment for each child: "refer" if the child needed observation or treatment because of his eyes; "nonrefer" if special eye care was not needed.

The screening procedures studied were teacher observation, the Snellen test, a test of visual acuity at 14 inches using selected lines from the Lebensohn chart for sixth grade and from the Guibor chart for first grade, the Massachusetts vision test, the Keystone View Co. telebinocular, and, for sixth grade students, the American Optical Co. sight-screener and the Bausch and Lomb orthorater.

Methods

Each student was given all of the screening tests (except teacher observation) by each of two testers: a technician who tested all students in the study and the nurse for the school the student attended. In addition, each student was given a Snellen test by his classroom teacher. The amount of preliminary training given these different testers varied and was planned to simulate the amounts that, in a school vision testing program, it would be practical to provide for one tester for many schools, one tester for each school, or each classroom teacher.

The clinical examination and the various tests were administered in randomized order so as to minimize the influence of any learning factor.

A referral by a screening procedure of a student classed as "refer" by the ophthalmologist was considered a "correct referral." Referral of a student placed in the "nonrefer" category by the ophthalmologist was considered an "incorrect referral."

School Nurse Has Job In Vision Testing

The function of the public school nurse in the vision testing research program in St. Louis, Mo., was reported by Annette L. Gronemeyer, R.N., of the St. Louis Board of Education's division of health and hygiene.

Each nurse selected for the eye study was given special instruction regarding procedures and instruments and tests to be used. After being tested with 18 practice cases under supervision, she then was not corrected or assisted unless she asked questions.

Children were tested with glasses if they wore them, and if they wore them only for special purposes they were tested accordingly. Children with defective vision were subject to follow-up routines, in which Miss Gronemeyer reported complete and appreciative cooperation by parents.

The Classroom Teacher Conducts Tests

The procedure in the St. Louis vision testing study is one that any classroom teacher, in the absence of a trained nurse, might use as a preliminary screening, Lula Hack, elementary teacher in the Bryan Mulvanphy School, reported. In the study teachers aided in convincing parents of the tests' importance and no children were tested whose parents failed to give consent, Miss Hack said.

Preliminary instructions for participating teachers were given by Dr. Marian M. Crane of the Children's Bureau. Later the teachers received directions for administering the test. Just prior to the actual testing, they were trained by a nurse consultant in the use of the eye chart and the technique of recording observations.

Snellen Test Used

In giving the Snellen test the teachers followed directions of the Massachusetts Vision Test for Elementary Schools. A special biographical form was filled out for each child. For children unable to read, Miss Hack suggested that teachers devise a simple child's game based upon the testing procedure to put the children at ease and to show them how the "fingers" point on the "E" chart.

In giving the tests, the teachers worked independently without coaching and without supervision. All corrections of errors and entries of omissions were made by the teacher, any part of the test being repeated if necessary. Individual tests required 2 to 3 minutes.

A successful teacher must be constantly alert to detect any sign of difficulty that might hamper the child in learning be it impaired vision or impaired hearing, Miss Hack concluded. Having found it, immediate correction or elimination is imperative to the child's well-being.

Laboratory and Field Advances In Food Sanitation

Newer developments in food sanitation and laboratory measurements were discussed by the food and nutrition and laboratory sections, and the problems examined from a variety of angles. It was reported that crushed ice is likely to be of low sanitary quality, that enteric pathogens and coagulase-positive micrococci can be identified in 2 days, that efficiency levels of selenite enrichment broth must be watched. A 4-step test for bacterial contamination of dishes was outlined to a subcommittee; and the engineering section told of the use of isotopes in dishwashing experiments.

Antiseptic Powdered Soaps May Benefit Workers

Industrial use of powdered antiseptic skin cleansers may bring about increased bacteriostatic protection as well as a greatly reduced transmission of communicable disease by skin contact, according to experiments conducted by M. Martin Maglio, Ph.D., chemical director, and John M. Hannegan, Ph.D., manager, respectively, of the industrial skin cleanser division, of Vestal Laboratories, Inc., St. Louis, Mo.

Since the development of effective germicidal bar and liquid soaps, the desirability of incorporating a germicide into industrial cleansers has long been recognized, they said. The industrial worker would thus be less subject to dermatitis, boils, and carbuncles, they said.

In their experiments two antiseptic powdered skin cleansers were prepared, one with a percent hexa-

chlorophenyl, the other with bis-(2-hydroxy-3, 5-dichlorophenyl) methane. A powdered cleanser duplicating the antiseptic ones except for the germicide was used as a control. An ordinary home bar soap was used for comparison. A liquid antiseptic soap containing 2-hexachlorophenyl, standard in many hospitals, was used for comparative purposes.

Washing was carefully controlled. The Cade multiple-basin was the basis for the method used. Rinsings in each basin were sampled, plated, incubated, and the number of colonies present were determined by a Quebec colony counter. The low bacterial counts obtained were clearly not due to bacteriostasis, they stated. The antiseptic liquid soap and the two germicidal powdered cleansers were found equivalent in their effect. The powdered cleansers were 60 percent more efficient than the unmedicated duplicate.

Selenite Broth Media Vary in Efficiency

Greater emphasis on the need to determine the efficiency of selenite enrichment broth is necessary whenever new batches of the medium are to be used or when a change is made in the character of the inoculum, according to W. R. North, B.S., and M. Thomas Bartram, Ph.D., of the Division of Microbiology, Food and Drug Administration.

Deficiencies in the productivity of selenite broth for recovery of *Salmonella* from pure culture and from egg products have been noted, both in commercial products and in media prepared in the laboratory from different types or batches of peptone, they said.

In the isolation of *Salmonella* from egg products, these deficiencies may be overcome in part by the addition of the substance under examination, they stated, and adding cystine in a 10-microgram-per-milliliter concentration further lessens the deficiency in productivity of the broth. In examining substances which do not contribute to the nutritional character of the medium, similar additions of cystine are essential.

Adsorption of Bacteria Hampers Dishwashing

Normal dishwashing methods will dislodge only a small fraction of some types of organisms strongly adsorbed on eating utensil surfaces, reported Gerald M. Ridenour, Ph.D., associate professor of engineering, and Edward H. Armbruster, research associate, University of Michigan School of Public Health.

The researchers investigated the bacterial cleansibility of glass, china, steel, plastic, and aluminum, using P²² tagged bacteria, and measuring by the radioactive count method. Their studies covered the relative retention of different bacteria on different type eating utensil surfaces, different conditions of surfaces, absence and presence of organic soil, and soil film build-up resulting from repeated soiling and washing.

Adsorption Characteristics

Other results of the experiments follow:

The strength of adsorption varies with type of organism: some are lightly adsorbed, others strongly. Adsorption of the organism is specific for a surface.

Of the organisms studied, *Micrococcus aureus* was the most difficult and *Escherichia coli* the easiest to remove from a given surface.

In the absence of soil, percentage removal of *M. aureus* from china, glass, and steel surfaces, with standard detergency and temper-

ature conditions, was between 97 and 99+, but between 56 and 84 on plastic and aluminum surfaces. The large variation noted on plastic eating surfaces did not exist among china or glass surfaces.

With *E. coli* in the absence of soil, ease of removal increased for all surfaces, varying between 99 and 99+ percent for china, glass, and steel, and between 90 and 98 percent for plastic and aluminum.

When the bacteria were mixed with an organic soil, the efficiency of removal increased markedly for all surfaces. When the bacteria were overlaid with the organic soil, efficiency of removal from plastic surfaces dropped quite markedly in relation to china, glass, and steel.

When plates were worn or scratched, removal efficiency decreased for all surfaces, but the same relation existed between different surfaces as with the unworn surfaces.

4-Step Method Measures Dish Contamination

Additional experimental work in determining the bacterial contamination of dishes was described by Albert F. Guiteras, Ph.D., director, Hudson Laboratories, Inc., New York; Lawrence H. Flett, B.S., director, new products division, national aniline division, Allied Chemical and Dye Corp., New York; and Rebecca L. Shapiro, chief bacteriologist, Hudson Laboratories, Inc.

This method, the authors reported, is designed primarily for research work and for routine regulatory health control purposes. It involves four steps; (1) placing the dish to be examined as a cover over a Petri dish containing melted tryptone glucose extract agar at about 45° C.; (2) inverting the two dishes so that the Petri dish is on the bottom; (3) allowing the agar to harden at room temperature; and (4) incubating the set-up for 48 hours at 37° C. After incubation the dish is removed, leaving the agar in the Petri dish

where the colonies are counted with the aid of a Quebec colony counter.

The authors reported two experiments using artificially contaminated plates. A comparison of this method with the swab contact method revealed that the total number of organisms recovered by the new method was quantitative, within the limits of experimental error, whereas the number recovered by the swab contact method was significantly lower, even with the use of two swabs.

Series of Tests Reveals Crushed Ice Is Unsanitary

Ice as dispensed at many eating establishments is of extremely low sanitary quality, V. D. Foltz, M.S., Kansas Agricultural Experiment Station, Manhattan, Kans., stated in a report on a study of 114 samples collected from hotels, restaurants, soda fountains, and hospitals in central Kansas.

Presenting detailed results obtained from physical and bacteriological examination of crushed ice and of cubed ice from automatic ice machines, Mr. Foltz reported that:

Only 27 samples were of acceptable quality, using absence of coliform as the criterion of potability.

Of the 77 samples of commercial crushed ice, only 10 were free of coliform organisms, indicating gross contamination during grinding, sizing, bagging, and delivery to the consumer, since samples of cake ice from which crushed ice is made were found to be entirely satisfactory.

Of 37 ice-cube samples, 17 were coliform negative. Ten of these samples were collected from hospitals, and all were negative for coliform and clostridia, demonstrating that ice-cube machines can be operated in a sanitary manner and the product dispensed in good condition.

Of 32 ice-cube samples examined for micrococci and streptococci, 22 contained the former and 19 the lat-

ter; these organisms were found in only one of the 10 hospital samples.

Inert material found in the samples included sand, clay, assorted colored fibers, assorted colored thread, vegetable fiber, fingernail-polish scales, insect fragments, rodent hairs, human hairs, and wood splinters. Although this material is not a direct criterion of bacterial pollution, it indicates the extent to which the product may have been polluted, Mr. Foltz remarked. The ice-cube samples were remarkably free of dirt, the hospital samples containing the least amount.

Rapid Coagulase Method Equals Routine Test

A survey among 341 food handlers to determine the carrier rate of coagulase-positive micrococci revealed that 73 (38 percent) of the 191 males and 56 (37 percent) of the 150 females examined were nasal carriers of this causal agent of staphylococcal food poisoning, reported S. J. Millian, M.S., H. H. Weiser, Ph.D., J. M. Baldwin, Ph.D., and J. M. Birkeland, Ph.D., of Ohio State University's department of bacteriology.

These carrier rates, determined at the university's dining halls, are 5 to 10 percent less than those reported by investigators of other groups, they said, and were found to be unaffected by the age or sex of the food handlers.

A study of the distribution of penicillin-resistant coagulase-positive micrococci was also made. Twenty-seven percent of the male and 23 percent of the female carriers were found to harbor penicillin-resistant strains.

A new method was developed which can detect carriers of coagulase-positive micrococci within 24 hours. After sampling, the nasal swab is put into a 12 ml. centrifuge tube containing 5 ml. of BHISB (brain heart infusion salt broth) and is incubated at 37° C. for 20

hours. The broth is then centrifuged, the supernatant decanted, and 0.5 ml. of fresh citrated whole rabbit blood is added to the packed cells. The suspension is thoroughly shaken and transferred to agglutination tubes which are incubated in a 37° C. water bath for 3 hours. The contents of the tubes are then observed for coagulase activity.

The efficiency of this accelerated method, they said, was comparable to the routine procedure using sheep blood agar and lactose salt agar.

The study also revealed, they concluded, a high correlation existing between chromogenesis on lactose salt agar and coagulase production.

Salmonella and Shigella Identified in 2 Days

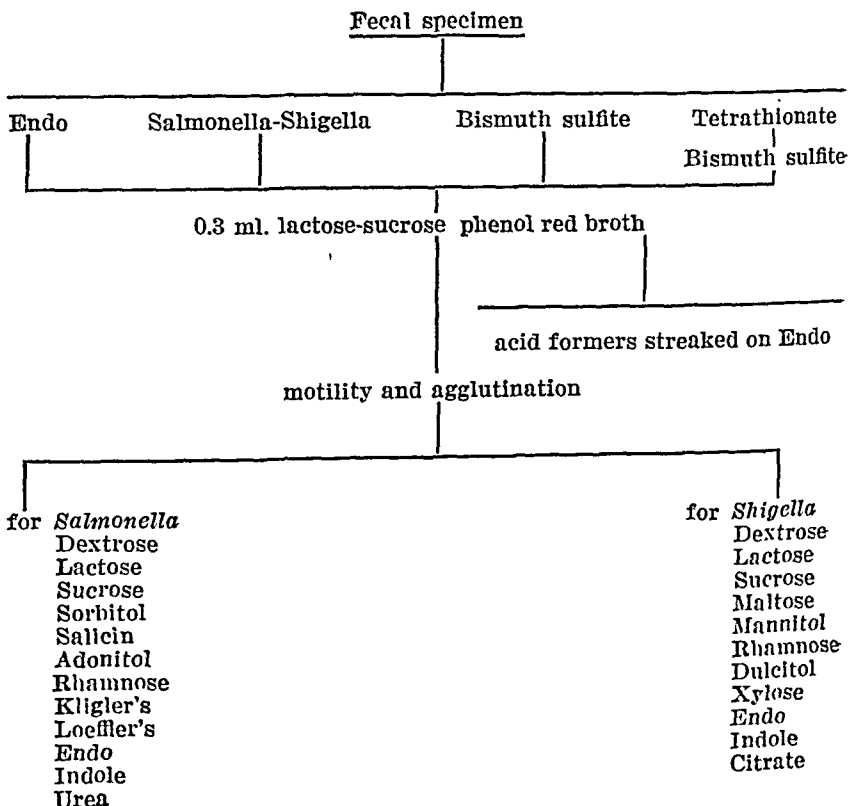
Enteric pathogens can be isolated and identified from stools in 2 days

by the method recommended by Robert A. MacCready, M.D., and Marion B. Holmes, B.S., assistant director and junior bacteriologist, respectively, of the institute of laboratories, Massachusetts Department of Public Health.

According to their report, the method involves the fishing of colonies from the primary plates into small lactose-sucrose broth tubes (0.3 ml. of broth), incubation for 1-3 hours in a 37° water bath, performance of hanging drop motility and agglutination tests, and inoculation of the confirmatory carbohydrates, all on the same day. This procedure, they said, saves a day over the customary double or triple sugar agar screening techniques. (See chart.)

They also described a method, employing the so-called micro-techniques in all the confirmatory tests, whereby *Salmonella* can frequently be identified only 7 hours after the fishing of the colony and *Shigella*. the following morning.

Outline of procedure for identification of *Salmonella* and *Shigella*



Importance of Animal Diseases To the Health of Man

Problems of animal diseases as they relate to the health and welfare of man were presented at several section meetings. Studies of sporadic bovine encephalomyelitis and an outbreak of psittacosis were reported to the epidemiology section; the effect of mass immunization of dogs against rabies, to the laboratory section. A joint session of the epidemiology and laboratory sections discussed leptospirosis. A paper on foot-and-mouth disease as a threat to the United States and papers on poultry as a potential source of viruses pathogenic to man and on progress in grading poultry and in poultry dressing sanitation were given at a joint session of the engineering, epidemiology, food and nutrition, and laboratory sections.

Foot-and-Mouth Disease Threats Emphasized

Foot-and-mouth disease is the primary animal disease menace in the world, declared M. S. Shahan, D.V.M., of the U. S. Department of Agriculture's Bureau of Animal Industry.

The United States has experienced the disease nine times, the last outbreak occurring in 1929, said Dr. Shahan. The earlier infections were mostly introduced by live animals from infected countries but several times the disease gained entry through infected animal products.

He felt that the United States is fortunate in its comparative geographic isolation and in its largely self-sufficient livestock production, but it still is necessary to import large quantities of animal products.

The difficulties in this country, he said, are complicated by the occurrence of two virus-induced vesicular diseases—stomatitis and exanthema—which are clinically indistinguishable from foot-and-mouth disease. He warned that although it has been 23 years since an occurrence of the disease, there is constant danger of its introduction.

Dr. Shahan described various possible means of eradication through widespread inspection, quarantine, destruction of infected and exposed animals, and disinfection of premises. He emphasized that importation into this country of cattle, sheep, swine, goats, and other susceptible animals—and any meats of these species—is prohibited from any country classed as infected. The Bureau of Animal Industry with the aid of other Federal agencies supervises and inspects such international commerce, he said, and often even garbage from planes and ships is refused entry for livestock feed since it may contain infected meat scraps that could introduce foot-and-mouth disease.

Possible Impact

Although the task of protection is tremendous, he continued, the impact of the disease here could be disastrous since it involves the entire national economy. The productivity of the susceptible species might well be reduced by 25 percent or more, he said, and such a great loss would be multiplied by the stringent quarantines necessary for control.

Dr. Shahan felt that H. S. Frenkel's laboratory success in cultivating an adequate virus vaccine—utilizing minced tongue epithelium in a nutrient synthetic fluid medium—is a significant step toward solving one of the major problems of vaccine production in this field.

In continuance of this country's

vigilance against a possible future outbreak of the disease, he reported that facilities for safe, scientific investigations will be completed by 1954 on Plum Island, in Long Island Sound, N. Y. Congress has already appropriated funds for this project, he said, and plans for its development are now being made.

Bovine Encephalomyelitis In Western Cattle

The agent of sporadic encephalomyelitis has been linked to the psittacosis-lymphogranuloma group of viruses, according to Herbert A. Wenner, M.D., of the University of Kansas Medical Center, Kansas City, Robert W. Menges, D.V.M., epidemiology branch of the Public Health Service Communicable Disease Center, Kansas City, Gerald S. Harshfield, D.V.M., veterinary department of the South Dakota State Agricultural Experiment Station, Brookings, and Te Wen Chang, M.D., fellow of the Haynes Memorial Hospital, Boston.

Dr. Wenner and his associates found encephalomyelitis widespread among young cattle in the midwestern States, with immunity relative or absolute in many adult cattle. An association of human illness with herd outbreaks has not been observed, but these studies are incomplete. Serologic evidence suggests that human beings may have illnesses, yet unrecognized, caused by BEV (bovine encephalomyelitis virus), they stated.

Symptoms Observed

Dr. Wenner pointed out the epidemiological and epizootiological implications of the disease and described the symptoms observed in sick cattle. Morbidity rates for calves averaged 30 percent; mortality rates varied from 20 to 100 percent. Sharply localized epizootics have broken out among herds into which calves purchased from dealers were introduced. The velocity of infection was usually swift and the duration of the illness averaged 4 weeks, the study revealed.

Necropsies showed a seropurulent exudate involving pleural, pericardial, and peritoneal surfaces. Microscopic examination showed fibrinous serositis and meningoencephalomyelitis.

When tissues from affected calves were inoculated into guinea pigs and into developing chick embryos, illness or death of the experimental host resulted. Minute elementary bodies indistinguishable from those of the psittacosis-lymphogranuloma venereum group were found in both hosts. Antigens prepared from the strains of the virus (BEV) fix complement with specific serums.

Cattle with naturally occurring forms of the disease, as well as those experimentally infected, developed CF antibodies (BEV), the researchers reported.

Rabies Problem Attacked Successfully in St. Louis

Since 1921, rabies has become an increasingly important and complex public health problem in St. Louis, Mo., reported Rabies Control Officer Luther E. Fredrickson, D.V.M., Deputy Health Commissioner Joseph C. Willett, D.V.M., and Health Commissioner J. Earl Smith, M.D., all from the St. Louis Department of Public Welfare, and E. R. Price, D.V.M., public health veterinarian, Missouri Department of Public Health and Welfare.

Six rabies epizootics have occurred in St. Louis since 1921 and each outbreak has been more serious and longer than previous ones. Therefore, according to the health officials, after conferences with local veterinarians and State health officials the St. Louis health commissioner—on advice of an investigating Public Health Service veterinarian—recommended in 1951: (1) mass immunization clinics; (2) an educational program for dog owners; (3) health division control of stray dogs; and (4) an immediate ordinance requiring annual vaccination for all dogs and permanent control of the dog pound by the health commissioner.

A quarantine order requiring every dog in St. Louis to be immunized against rabies and confined to the owner's premises was immediately issued and an emergency fund of \$25,000 was authorized for a mass antirabies program. By June 1, 1951, some 58,000 dogs—70 percent of the city's dog population—were immunized against rabies in public clinics or by private veterinarians.

The results were significant, the officials continued. In August, 2 months after the closing of the public clinics, only one rabid dog was reported, as contrasted with 79 in May. Eighteen dogs were diagnosed as rabid from July–December of 1951 as compared with 309 for the first 6 months of the year, and the incidence has remained low in 1952. However, because of only sporadic control attempts in the metropolitan areas immediately adjacent to St. Louis, Mo., the incidence of rabies there has continued at a relatively high rate.

They concluded that an intensified program of inoculating a high percentage of the canine population in a short period of time is much preferable to sporadic inoculation of small numbers over an extended period.

Techniques for Confirming Leptospirosis Diagnosis

Laboratory confirmation of leptospirosis may be most readily and reliably made by employment of direct blood-culture methods and serologic examination by complement-fixation employing sonic-vibrated leptospiral antigens, reported Maj. William S. Gochenour, Jr., D.V.M., Lt. Col. Robert H. Yager, D.V.M., Joseph E. Smadel, M.D., Psyche W. Wetmore, B.A., and Capt. John A. Hightower, M.D.

Major Gochenour and Lieutenant Colonel Yager, of the U. S. Army Veterinary Corps, are deputy director and director, respectively, of the veterinary division, Army Medical Service Graduate School, Walter

Reed Army Medical Center. Dr. Smadel is director of the school's communicable disease division; Mrs. Wetmore is with the department of veterinary bacteriology; and Captain Hightower, of the U. S. Army Medical Corps, is with the Tropical Research Medical Laboratory, San Juan, Puerto Rico.

The researchers based their report on studies of 79 bacteriologically proved human cases of acute leptospirosis encountered in Puerto Rico from October 1950 to May 1952. They described in detail the techniques employed in confirmation of the clinical diagnoses and in determination of responses to antibiotic therapy.

Blood cultures should be made during the initial febrile stage of illness, they noted, and serial serum specimens, the first obtained early in the disease, are essential to the demonstration of the diagnostic rise in antibody level.

They announced that both of the procedures recommended are within the capabilities of the routine diagnostic laboratory. Identification of leptospiral strains isolated requires the employment of antibody adsorption techniques and is best accomplished at a leptospiral reference laboratory, they added.

They expressed the opinion that existing knowledge of the antigen-antibody reactions in the leptospirosis does not encourage the hope that new serologic techniques will materially reduce the time required to confirm the diagnosis of leptospirosis. It would appear, they said, that the most promise lies in the direction of earlier detection of leptospirae than is possible with existing methods.

Advances in Leptospiroses Depend on Laboratory Aid

In another paper, Lieutenant Colonel Yager and Major Gochenour suggested four measures for advancing the investigation and control of

the leptospiroses and indicated areas of deficient knowledge in the field.

Most important, they said, adequate support should be made available for basic research into the epidemiology, epizootology, prophylaxis, and control of the leptospiroses. This implies support of fundamental study of the organisms and of the pathogenesis of these diseases, they explained.

A second measure recommended was the establishment of diagnostic laboratory services at the Federal, State, county, and city levels; a third, the establishment of a reference laboratory, comparable to the salmonella typing center at the Public Health Service Communicable Disease Center, to provide definitive identification of leptospiral isolates and technical assistance to the diagnostic laboratories.

Drs. Yager and Gochenour also suggested that leptospiroses in man and domestic animals be placed on the list of reportable diseases. Recognizing the administrative burden inherent in such a step, they nevertheless consider reliable incidence, morbidity, and distribution statistics necessary to the realistic evaluation of the significance of the leptospiroses.

Organism Characteristics

Progress in diagnosis, prophylaxis, and therapy, they said, hinges upon knowledge of the infecting agent itself. Although certain characteristics of the leptospirae have been established, their nutritional requirements, metabolism, and enzyme systems are not known. "Determination of optimal nutritional and environmental requirements for leptospiral cultivation would not only assist in the prosecution of investigative studies," they noted, "but would materially increase the value of culture examination as a diagnostic procedure."

Concerning the epidemiology of the leptospiroses in the United States, the veterinarians pointed out that animal reservoirs of three strains have been established; three lepto-

spiral infections have been recognized only in man; and one has been found only in rats and mice. "It is essential not only that the animal reservoirs of infection be determined, but that the mechanism of transmission of infection to man be demonstrated," they stated.

Therapy and Prophylaxis

Information on therapy is also meager, they said. Reports too often deal with a limited series of patients and are often based upon clinical impressions alone. Excellent studies have been conducted in the laboratory animals on antibiotic therapy, but the encouraging results obtained cannot be translated directly to man or the domestic animals. At present, definitive therapy is limited to the use of aureomycin or streptomycin in dogs.

"Studies on vaccination prophylaxis have been limited to dogs," they continued, "and here a satisfactory vaccine against one strain only . . . has been devised. The problems in development of satisfactory vaccines, though not insurmountable, are formidable. To be of value, such vaccines must protect against all strains known to occur in the species in the United States. Further, not only must clinically apparent disease be prevented, but inapparent renal carrier states as well. This requires a most critical and careful evaluation of vaccines developed in the future."

Suggests New Controls On Psittacine Birds

Further study of psittacosis and some form of renewed control over traffic in psittacine birds were recommended by Theodore S. Drachman, M.D., M.P.H., first deputy health commissioner, Westchester County, N. Y., Department of Health.

After relaxation of foreign quarantine restrictions and removal of interstate barriers, New York revoked controls on the importation,

breeding, and sale of psittacine birds early in 1952. In May 1952, two outbreaks of psittacosis occurred in Peekskill and Ossining, N. Y., both in Westchester County, Dr. Drachman said. The last previously reported cases in the county had occurred 10 years earlier.

Three cases of psittacosis were confirmed in each series, with the possibility of a fourth case in Ossining, and as many as four or more additional cases in Peekskill. The Ossining episode was a typical household outbreak. The one in Peekskill occurred among employees in a chain department store selling parakeets, along with other birds. No connection has been established between the infected birds responsible for the two series of cases, Dr. Drachman said.

Presents Facts

Dr. Drachman reviewed the following facts in the light of the Westchester experience:

There appears to be a generalized endemicity of psittacosis on certain bird farms in Florida and some other States. Despite control measures imposed in Florida aviaries where the disease is known to exist, it is impossible to say with absolute assurance that birds shipped from Florida or anywhere else in the country are free from psittacosis.

When blood sent to laboratories for other types of examination is tested for psittacosis antibodies, a far from routine laboratory procedure, unsuspected cases are discovered. The possibility of many missed cases is suggested. In half of these cases, inquiry failed to reveal birds or mammals in the patients' environment.

The case fatality rate, as high as 40 percent in the past, has been reduced to 2 percent with antibiotics. Yet little appears to be known of the possibility of developing fastness to antibiotics. In the few Westchester cases, although there were no fatalities, relapses and prolonged convalescences were not prevented by antibiotic therapy.

To Be Answered

Dr. Drachman recommended further study of these questions:

Why is psittacosis highly communicable and dangerous to laboratory workers, moderately communicable on contact with infected birds whether apparently ill or not, and difficult to contract from a human case?

What is the actual psittacosis experience of the general population? Is it a common disease, or a rare one as has been believed?

What are the factors that determine human susceptibility?

Are there differences of epidemiological importance in the psittacine and nonpsittacine strains of the virus as implied by the separate terms of psittacosis and ornithosis? Is there a significant difference in the indoor exposure to a pet and to infected poultry outside?

What is the likelihood of a human carrier of virus, casual or otherwise, infecting a previously healthy household pet which may then become a health menace?

Poultry Grading Program Continues to Grow

Interest of public health groups in the U. S. Department of Agriculture program of grading poultry on a voluntary basis is stimulating health departments to give special attention to the drafting of sanitation standards for poultry plants, said Alfred H. Fletcher, M.S., director, division of environmental sanitation, New Jersey State Department of Health.

Mr. Fletcher also reported that as a result of the mutual interest of national health groups, the poultry industry, and the Department of Agriculture in better grading standards, the department's grade label will not be stamped on eviscerated poultry after June 30, 1953, unless the poultry has been inspected for wholesomeness and processed under sanitary conditions.

"It is hoped that this action will tend to further encourage the processing of poultry in the ready-to-cook form," he said, remarking that it would be highly desirable from the public health standpoint.

Other Achievements

Reporting on other achievements of the voluntary program, he said:

Poultry inspection in 1952 has increased about 40 percent over 1951. Approximately 17 percent of the total poultry sold on a dressed weight basis is inspected. About 100 million more pounds of poultry were graded in fiscal year 1952 than in 1951. Grading service is now maintained in 312 processing plants. More than half of the poultry sold from farms in fiscal 1952 moved in ready-to-cook form at the processor level. And almost 800 million pounds of poultry were inspected for wholesomeness.

The voluntary program depends on the cooperation of the processor and the willingness of the consumer to pay the extra cost of the grading service, Mr. Fletcher stated. It is under the Department of Agriculture's Production and Marketing Administration and provides services at each plant, for each bird.

"A sound Federal poultry grading inspection program is considered basic to the development of sound local public health programs," Mr. Fletcher declared. The Federal program sets the pace for content and standards, and the plants under its supervision form the nucleus around which States develop their local programs, he indicated.

Viruses Pathogenic to Man Carried by Poultry

Poultry must be regarded as a potential reservoir of viruses pathogenic to man, warned H. J. Stafseth, D.V.M., Ph.D., head of the department of bacteriology and public health, Michigan State College.

Dr. Stafseth based this premise on a review of the literature of the bacterial and viral diseases which afflict poultry. However, he stated that although some two dozen poultry diseases are communicable to man, at present most of the cases of human illness contracted from poultry have been confined to individuals or small groups, that very rarely have considerable numbers of people been affected.

He listed salmonellosis, psittacosis, erysipelas, and Newcastle disease, as those with most public health significance.

Four Government Agencies Concerned With Poultry

The Food and Drug Administration, the Public Health Service, and the U. S. Departments of Agriculture and Defense are all concerned with poultry dressing sanitation, and each performs activities clearly defined through public law, but all work together to obtain a unified program, stated Harry E. Goresline, Ph.D., chief, stability division, Food and Container Institute, Chicago Quartermaster Depot, U. S. Army, Chicago.

The Food and Drug Administration is concerned with poultry products in interstate commerce or products being processed for that purpose, he noted, the aim being to prevent shipment of birds diseased, improperly processed, filthy, decomposed, or in any way injurious to health. Market surveys regularly determine the quality and condition of the poultry products being sold, and a regular program of sanitary inspection of poultry plants is carried out. Legal action may be taken against processors when objectionable conditions are found.

The Public Health Service provides advisory, information, and consultation services for other Federal agencies, the States and their political subdivisions, and food industries,

Problems, Methods, Programs In Community Fly Control

Dr. Goresline said. He remarked that the Service has initiated field studies on the sanitation problems of the poultry industry and intends to develop sanitation standards, covering inspection for wholesomeness, which can be incorporated into a model standard ordinance. The ordinance, of course, will be for voluntary adoption by States, cities, and other jurisdictions concerned, he added.

Agriculture and Defense

The U. S. Department of Agriculture offers poultry inspection and grading services to individuals, processing plants, or other interested parties upon request. An applicant for such services must comply with certain sanitary regulations and pay the costs of the services. The purpose of poultry inspection, he explained, is to determine, during the eviscerating operation, the condition, healthfulness, and fitness of poultry for human food and the wholesomeness of edible parts or processed products produced from inspected poultry. Poultry grading involves the sorting of individual carcasses as to quality and size and the determination of class and condition.

The poultry sanitation program in the U. S. Department of Defense, he continued, is centered around the procurement of poultry meat for the armed forces. The awarding of contracts for poultry meat is limited to approved plants or to those operating under the Department of Agriculture poultry inspection service. If only dressed poultry is produced, the operation must be carried out under the supervision of armed forces veterinarians, he noted. However, if various types of ready-to-cook or canned poultry products are being produced, the plant must be operated under the supervision of the poultry inspection service of the Department of Agriculture. The actual inspection of the product is a responsibility of the armed forces, he added.

Community fly control operations in various parts of the country were described in papers presented before the Conference of Municipal Public Health Engineers. In Kansas City, Mo., special fly problems were created by the flood of Missouri-Kansas Rivers in 1951. In Phoenix, Ariz., a fly control program is devoting its major efforts to correcting insanitary conditions, particularly the indiscriminate dumping of wastes from the vegetable-packing industry in the State. The Texas program is described as "just plain community sanitation, glamorized with the magic of wonder chemicals and systematized by fly density estimating techniques."

1951 Kansas River Flood Creates Fly Problems

Fly counts during the height of activities in the wake of the Kansas River flood, July 1951, ranged from 2 to 500 per square yard in the central industrial district of Kansas City, Mo., and averaged 150 per square yard in other areas studied, Carl C. Potter, B.S., commissioner, public health engineering, Kansas City Health Department, stated.

Immediate health problems during and following the flood were lack of drinking water, disruption of plumbing and garbage collection, proper housing, food service in establishments allowed to operate, and the expected prevalence of insects when the waters subsided. Garbage collection was disrupted when vehicles were caught in the flood. This factor and an estimated 15,000 dead stockyard animals

caused the health department immediate concern in regard to fly control, Mr. Potter said.

The animal carcasses were dumped into the river, and were immediately carried on into the Missouri River. This practice continued for 6 days until trucks and equipment were available to transport the dead animals to landfill dumps.

As the flood subsided it was clear that the dead animals were not the greatest source of fly-breeding problems. The clean-up had been rapid enough to keep this under control, the speaker continued. Damaged seed, grain, and foodstuffs which had taken more time to remove were found to be the heaviest breeding places for the flies.

Control measures consisted of the use of 8,800 gallons of 0.5 percent BHC emulsion in larviciding, 450 gallons of 5 percent DDT emulsion in residual spraying, and 330 gallons of 5 percent DDT and 2 percent chlordane emulsion in space spraying. The spraying and larviciding were continued until the entire district was cleaned up and business resumed operation.

Control Effort Makes City Less Attractive for Flies

Although temporary fly control measures, such as space spraying, are occasionally utilized, the major efforts of the Phoenix, Ariz., program are devoted to eliminating insanitary conditions, said Jerrold M. Michael, M.S.E., superintendent of sanitation, Phoenix Public Health Department.

The major sanitation problems given attention, according to Mr. Michael's report, were chicken and animal pens; refuse storage, collection, and disposal; substandard

sewage disposal systems; large-scale commercial animal feeding operations; food processing plants; waste vegetable disposal fields; and waste water disposal from evaporative cooling systems. An example of permanent corrective measures instituted, he said, is a newly developed process of waste vegetable reclamation.

"In past years, culls and wastes from the vegetable-growing industry of Arizona have been dumped wherever the packer could find available space," he explained. "As the area around the packing shed became more urbanized, the fly problem . . . grew steadily worse." A solution having economic value as well as eliminating fly breeding spots was the adoption of a method of recovering the vegetable wastes for livestock feed.

Other accomplishments of the 4-year-old program included: installation of 13,000 new garbage containers; wrapping of garbage by 75 percent of the housewives; purchase of 9 new packer-type garbage collection vehicles, increasing the number to 14; establishment of a sanitary landfill, practically eliminating the feeding of garbage to hogs; 75-percent reduction in number of animal pens and 51-percent in number of fowl pens; elimination of 324 privies; and renovation of waste disposal systems in four abattoirs.

Program Development

He named as essential steps in developing a fly control program: establishing interest among city officials, the public, and the staff who will operate the program; defining specific problems needing attention; training a staff; and finally, applying control and inspection measures.

He pointed out that it is particularly important, in defining the problem, to include in the program the area surrounding a city's corporate boundaries, as "the fly . . . is a notorious violator of 'City Limits' signs." Once the extensiveness of each problem is determined, decisions may be made as to the problems to receive initial efforts,

although, of course, many of the problems will be interrelated, he added.

Mr. Michael emphasized that the fly control staff should work closely with other members of the sanitation staff, particularly milk and meat inspectors and the sanitarians who inspect restaurants, groceries, hotels, and bottling plants. These sanitarians can incorporate fly control measures into their routine inspections, he explained. A close liaison should also be maintained with the city's refuse collection authorities.

More Communities Adopt Fly Control Programs

Education—sanitation—spraying!

These are the three steps vital to every successful community program for fly control, and more such local programs must be developed if the annual 9,000 deaths from fly-borne dysentery and diarrhea in the United States are to be reduced, said Joseph H. Coffey, B.C.E., and Paul W. Purdom, M.S.E., of the Public Health Service's Communicable Disease Center, Atlanta, Ga.

To encourage this development, they said, the Public Health Service inaugurated, in 1950, a CDC program to demonstrate to State and local health agencies how fly control could be achieved by communities.

They reported that seven demonstration projects were established in four States with high incidence of fly-borne dysentery—two each in Arizona, New Mexico, and Texas, and one in Kentucky. CDC provided technical personnel and guidance for the projects, but all costs of sanitation measures, spray materials, and their application were assumed by the communities.

Emphasize Prevention

The three-point program emphasizes that "the [best] way of attacking [flies] is to prevent them from breeding," and is applicable to most communities, they continued. In the initial educational phase, they explained, the entire community—indi-

viduals and groups of all types: housewives, pet owners, restaurateurs, farmers, food processors, and others—must be informed of the nature, habits, and preferred breeding places of flies, their danger to the community, and what can be done to eliminate them.

Second, adequate sanitation facilities must be provided in the community to eliminate fly breeding sources, they said. The demonstration program indicated that sanitation measures should be concentrated on refuse and on human, animal, and industrial wastes. They emphasized that not only should privies be eliminated, and frequent and thorough collection and disposal of refuse be made, but that all homes should be connected to existing sewers with new sewers extended to unserved areas.

Although these permanent accomplishments are generally more economical and effective to the community than are temporary measures, they are slow to achieve, they reported. Immediate sanitation needs can be satisfied by judicious chemical spraying of key breeding locations, they said, provided adequate consideration is given to the species of flies present and the chemicals and application methods required to eliminate them.

The fly control program proved effective in the demonstration projects, they reported, and 34 additional cities have adopted its principles, partly or wholly, under completely local sponsorship. Supervised by State fly control specialists, some cities have hired and trained their own control personnel, and many others are requesting technical assistance from State health departments.

Texas' Fly Control Plan Sparks City Development

Texas' fly control program is stimulating modernization of city facilities and plans for future community development, reported Clay-

ton H. Billings, M.S., senior engineer, Texas State Department of Health.

"Just plain community sanitation, glamourized with the magic of wonder chemicals and systematized by fly density estimating techniques, is our fly control program of today," he said.

Texas found that carrying a fly control program to completion meant overlapping in other health fields. Privy elimination meant sewer extensions. Sewer extensions led to enlargement of treatment plants and water system extensions, sometimes requiring increased water supply capacity. People even repainted and remodeled their homes.

One real estate developer began a subdivision of low-cost homes after learning that people living in a substandard environment would cooperate in a garbage storage and privy elimination program, Mr. Billings said.

In Kingsville, all oil drums customarily used for garbage storage were confiscated, and the city purchased \$5 dozen standard containers for sale, even on credit terms, to the public at acquisition cost, he reported.

Brenham maintains all privies at cost to the householder. As sewers are completed, Brenham eliminates privies by merely reclaiming its property, he said.

Privies which could not be removed through lack of available sewers were factors contributing to high grill counts. This led to the use by the State of 10 percent DDT dust in privy vaults and, later, 3 percent BHC dust.

No Organization Conflict

Vector disease control is under the bureau of sanitary engineering, which also handles other environmental sanitation, Mr. Billings said. He explained that policy and jurisdictional decisions presented no conflict since all projects were cleared at the State level and through the bureau's field offices.

Two demonstration projects were conducted in central Texas and near the Gulf Coast in 1950. Eight cities in 1951, and 28 in 1952, responded by undertaking locally financed projects. In the program expansion, it was planned to select sites significant from a diarrhea-dysentery standpoint and geographically located to influence surrounding areas, Mr. Billings remarked.

Most projects, however, were requested by city officials, some after an epidemic or disaster. One followed the 1951 polio and dysentery epidemic in Corpus Christi. An original control town, Mathis, "grew tired of being held a bad example and insisted on instituting standard fly control procedures," he said. Olney set up a project after a severe disaster. Strategically located projects were undertaken at Henderson, Braunfels, Midland, and Brownwood.

Fly control schools gave municipal officials a 3-day training in the use of insecticide application equipment,

fly grill counting methods, and other techniques. Thirty-one schools were held in 23 locations, he reported.

Corpus Christi's Control

In Corpus Christi, block-by-block premise inspection was conducted in substandard areas by a health unit sanitarian, a voluntary worker, and a police officer. In 1952 there were only 320 privies left from the original 1950 count of 2,446 privies within city limits. Enforcement of the plumbing ordinance since 1950 has converted to individual units 490 of about 700 community toilets serving two or more houses, he reported.

Mr. Billings compared the 30 infant diarrhea deaths in 1951, and 7 so far for 1952, with the 10-year average of 90.3 per year for Nueces County in which Corpus Christi is located. This improvement, he said, was attributed by the city-county health director to the combined efforts of the fly-control program and the well-child conferences.

Varied Methods and Practices In Providing Medical Services

A variety of methods and practices in the provision of medical services were described before sections of the APHA and associated groups in Cleveland. Rural group practice in a low-income community over a 6½-year period was reported, along with 8 years' experience with a group indemnity program in a metropolitan area. New York's Health Insurance Plan was described, as was the 6-year-old industrial program for hotel workers. From San Francisco came the story of multiphasic screening of longshoremen, and

hospital consultants heard a plea for a functional approach to hospital architecture.

County Group Provides Care in Reach of 90%

An example of providing a low-income community with the best available in medical care at a cost that at least 90 percent of the people can afford was cited by Caldwell Blakeman Esselstyn, M.D., medical director of the Rip Van Winkle Clinic, Hudson, N. Y., in his description of 6½ years' experience of group practice in that rural area.

Established under the aegis of a nonprofit, tax-exempt corporation, the clinic is staffed by 17 doctors. Services in 14 areas of medicine (including psychiatry) and dentistry are provided.

To make clinic membership attractive to physicians, immediate financial security is provided through salaries, cases are distributed in accordance with the various specialties, regular luncheon meetings are held for the staff, and fortnightly meetings are addressed by medical leaders in all fields. Provisions have been made for teaching responsibilities at the nearest medical center and the clinic has made available a current reference library and funds to enable the doctors to attend important conferences.

Branch Centers

To serve the outlying areas of Hudson County, two branch centers were established in 1950 in towns where medical services were lacking or were inadequate. They are served by a dentist and are in charge of a resident internist, while services of other members of the clinic are provided on a rotation system. That these branches are being utilized is shown by their services to 1,873 and 1,577 patients, respectively, Dr. Esselstyn pointed out.

To make services available at a cost that 90 percent of the people could afford, a fee schedule was established about the equivalent of the fees paid by a full-rate patient of a free out-patient department in New York City. No means test has ever been applied and 24 months of credit are extended to those desiring time to meet their obligations. For medically indigent families, \$88,000 worth of free care has been provided by the dispensary. No person has ever been refused medical care for financial reasons, said Dr. Esselstyn.

Preventive medicine is one of the main purposes of the clinic. The cancer detection center, organized

at the request of the American Cancer Society in 1947 and the first in upstate New York, is today recognized by the American College of Surgeons as a tumor diagnostic clinic. An outgrowth of this work is an annual review program, offering thorough medical examination designed for the symptom-free well adult. While not widely accepted by the people in the county, three corporations are now arranging this program for their executives.

Initial Problems

The establishment of this organization has not been without difficulties, said Dr. Esselstyn. Among them has been community skepticism. Also, fellow practitioners resisted despite the fact that each man in the clinic is a replacement and not an additional physician in the area, and every effort has been made to maintain the confidence of the patient in the referring physician, and to keep the referring physician promptly advised on findings.

The clinic experimented with a percentage system of remuneration in order to include two local practitioners on its staff. It found that this basis of remuneration acted as a deterrent to ease of referral since it automatically set up competition between the members of the staff and also between its departments. As a result it produced the clinic's present policy, namely, that men of equal training who are devoting an equal amount of time and effort and have served an equal number of years should be paid in equal amounts.

Dr. Esselstyn also pointed out that the community was rapidly transferring from the dream of the general practitioner of the past to the realism of the well-trained internist of the present, who functions as the family doctor of today within the group structure. When this has been fully understood one of the misconceptions associated with group practice will have been eliminated, he said.

4,000 Longshoremen Get Multiphasic Screening

Multiphasic screening with organized medical follow-up of some 4,000 longshoremen in the San Francisco area was successfully accomplished as a result of the active cooperation of the International Longshoremen's and Warehousemen's Union, the labor-management welfare fund, the Permanente Health Plan, and a wide array of public and voluntary health agencies in the community. E. Richard Weinerman, M.D., M.P.H., medical director of the Permanente Health Plan at the time of the survey and now medical consultant of the San Francisco Labor Council, and his associates, reported.

A battery of laboratory and other tests screened presumptive cases for clinical follow-up in the group medical centers of the Permanente Health Plan, a prepaid health plan in which the workers were enrolled. Screening procedures consisted of medical history, chest X-ray, electrocardiogram, and tests for height and weight, vision, hearing, syphilis, hemoglobin, blood sugar, urine sugar, urine albumin, and blood pressure.

Associated with Dr. Weinerman in the study were Lester Breslow, M.D., M.P.H., chief, bureau of chronic diseases, Benno K. Milmore, M.D., M.P.H., acting chief, bureau of chronic diseases, and Nedra B. Belloc, M.A., associate statistician, morbidity research project, all of the California State Department of Public Health, and Anne Waybur, A.B., health educator for the union.

Diseases, Defects Found

Diagnostic evaluation of men with positive test findings revealed significant amounts of disease and defect not previously known or not medically controlled, the study showed. The most striking health problem of these men, the majority of whom were in the older age brackets, was obesity, which showed a significant correlation with hyper-

tensive disease and diabetes. Dr. Weirnerman pointed out that 35 percent of the men tested had one or more positive diagnoses. More than half of these, representing one-fifth of the total tested, had at least one newly discovered condition.

The estimated total cost of \$9 per person tested for the screening and initial follow-up was considered by Dr. Weirnerman to be modest in terms of the health values attained. Multiphasic screening combined with organized follow-up, which eliminates the economic barrier to medical service, was presented as a useful technique for positive health education, early detection of disease, timely application of medical care, and delineation of controllable public health problems.

Broad Indemnity Program At ACWA Health Center

Members of the Amalgamated Clothing Workers of America have been covered by a comprehensive hospitalization and surgical indemnity program since 1944, but to furnish them even broader medical services the union's New York Joint Board opened the Sidney Hillman Health Center in April 1951 in lower Manhattan's garment industry area, reported Morris A. Brand, M.D., medical director of the center.

In a six-story building where comprehensive clinical services are provided in a spacious, colorful, well-lighted, and unhurried atmosphere, he continued, there are 34 examining and treatment rooms—including special suites for minor surgery, electrocardiography, radiology, cardiology, otolaryngology, physical medicine, and ophthalmology—60 dressing cubicles, and a clinical laboratory, a pharmacy, and a medical record room.

Although the center does not provide psychiatric treatment, dental care, or treatment for illnesses covered by workmen's compensation insurance, each member, upon payment of an annual 10-dollar fee, is

entitled to otherwise unlimited physicians' services. Additional nominal fees for treatments in physical medicine and for radiological and laboratory services were eliminated January 2, 1952. Approximately 33,000 union members and their wives were enrolled in the center at the end of 1952, Dr. Brand said, and 76.9 percent of those seeking services were 40 years of age or older.

During the center's first 18 months, he continued, its medical staff of 27 general physicians and 54 specialists provided 27,058 hours of service, 14,506 and 12,492 hours, respectively. All of them accept the ACWA Insurance Fund's surgical fees as their total fees for operations performed for the center's members.

Functional Hospitals Foster Improved Care

Hospitals must be architecturally functional if they are to provide adequate medical service to all who require it, maintained E. M. Bluestone, M.D., consultant at New York City's Montefiore Hospital. He told the joint meeting of the medical care section and the American Association of Hospital Consultants that flexibility of arrangement to permit continuing expansion of service is the absolute requirement of such construction.

Organized medical care is becoming increasingly better, Dr. Bluestone declared, and hospitals can lead in the progress through an expansion of both in-patient and out-patient facilities and services. But it must be an integrated expansion, he stressed; there can be no such line of demarcation between the two programs as a fixed hospital wall. He emphasized that medical care must not only be comprehensive and complete, but also must be continuous and sufficiently mobile as to be available to everyone, regardless of his urban, suburban, or rural location.

"Not Only the Sick"

To provide such extensive care, he continued, the hospital must treat not only the sick, but also the near and recently sick. Therefore, the medical, nursing, and social organizations of the hospital must be adjusted to the distinctive requirements of each group. A shift of emphasis by the hospital from the in-patient to the out-patient department, with attendant expansion of home nursing and social services, will reduce the demand on beds within the hospital, he said, but it will force the expansion of diagnostic, therapeutic, laboratory, and operating room facilities for they will have to serve beds outside as well as inside the hospital.

These are trends which the architect, as well as hospital trustees, should consider in planning suitably functional hospitals, Dr. Bluestone averred. He felt, however, that not only are few architects professionally equipped to survey accurately the present and future medical requirements of a community, but that many hospital executives also lack the ability to make such a study. Planning for medical care requires a working combination of both professional skills, he said.

Patient Choice Fosters HIP Group Competition

The vast majority of the 400,000 enrollees of the Health Insurance Plan of Greater New York "are convinced they are receiving the best medical care they have even known," Edwin F. Daily, M.D., deputy medical director of HIP reported to the medical care section.

Standards Are High

Medical care in HIP, said Dr. Daily, is provided only by physicians meeting the professional standards of the HIP medical control board. They work in groups, each group comprising at least 5 family physicians and a specialist from each of the 12 basic specialties of medicine

and surgery. Regular clinical staff meetings are required in each group, he continued, and emergency night and week-end calls are rotated among the members. Healthy competition between groups is maintained, he stated, since subscribers are free to change groups or family physicians within a group.

Centers Required

Each medical group must have a center with sufficient facilities for all ambulatory services by both family physicians and specialists, Dr. Daily said, as well as laboratory, X-ray, and special services such as electrocardiography, basal metabolism, and physical therapy.

All necessary medical care is provided for an annual fee per person paid to the selected medical group, Dr. Daily stated. After overhead and administrative costs have been paid, the remaining income is distributed among the physicians according to the formula of their particular group. "The capitation basis of payment . . . is a most important principle," he said, "relating fundamentally to the quality of medical care provided."

New subscribers are informed of the available services and the methods of using them, according to Dr. Daily, and are encouraged to discuss with their medical group directors any dissatisfaction with the plan and to offer suggestions for improvement. The subscriber service division at HIP headquarters receives all inquiries, complaints, and expressions of satisfaction with the plan. At meetings under the guidance of the HIP education staff the medical groups and their subscribers discuss subjects of mutual interest.

Medical Care Quality Reviewed

A study of the quality of medical care in all groups was made in 1949, Dr. Daily reported, and individual meetings were held with medical group directors and their staffs to review the findings. During the past year case histories of adults examined in several medical groups have been reviewed, he continued,

and statistical studies are continually under way "to detect any weaknesses . . . and to bring about improvements as rapidly as possible."

NYC Hotel Employees Have Modern Medical Center

Hotel employees in New York City were the first in the hotel industry to benefit by industry-wide group insurance, according to Frank P. Guidotti, M.D., medical director of the New York Hotel Trades Council and the Hotel Association Health Center, Inc., New York. Over \$5 million in benefits, including payments from life insurance, accidental death and dismemberment insurance, weekly accident and sickness benefits, and hospital benefits, were paid to beneficiaries and their families during the first 6 years of operation.

This program, known as the New York Hotel Trades Council and Hotel Association Insurance Fund, was created by the joint action of the Hotel Association of New York City, representing management, and the New York Hotel Trades Council (affiliated with the American Federation of Labor), representing labor, explained Dr. Guidotti. Ten local unions form the New York Hotel Trades Council.

Modern Facilities

On October 25, 1950, the New York Hotel Trades Council and Hotel Association Health Center opened a modernized 5-story building in mid-Manhattan to provide a comprehensive preventive medical program, diagnostic and specialist services, as well as in-hospital medical and surgical care to all hotel workers as of the first day of employment. The center's technical staff has 175 physicians (30 general practitioners and 145 specialists), 13 nurses, 4 laboratory technicians, 3 X-ray technicians, 2 physiotherapists, 2 pharmacists, 2 registered medical record librarians, and a registered medical social service worker.

The center encourages the relationship between patient and physician and cooperates with referring family physicians, Dr. Guidotti maintained. Patients are seen usually on the appointment basis. In addition to general medical services, optical examinations are offered, and counsel on social aspects of a patient's problem is given by the medical social service worker.

The health center maintains visiting nurses, blood bank services, and free ambulance service, said Dr. Guidotti. It distributes monthly information pamphlets on preventive medicine and health information; it recently established a pension plan for retirement benefits for hotel employees.

Care for 35,000

The health center provides care for 35,000 hotel workers, ranging in age from 18 to 85, who are employed in 177 New York City hotels and 51 concessions, representing 209 different occupations. Maids, waiters and waitresses, elevator operators, housemen, cooks, dishwashers, bellmen, busboys, and telephone operators are the most numerous employees.

Physician services per patient averaged 6.5 for the first year. Records showed the most frequent diagnoses to be:

	Number
Refractive errors-----	1,350
Hypertension and hypertensive heart disease-----	916
Acute upper respiratory infections-----	852
Allergic disease, including hay fever and asthma-----	576
Varicose veins-----	572
Arthritis-----	480

Funds are provided for this entire welfare program by an established percentage of the payroll of each contributing member-hotel. Cost of operation for the first year was \$600,000, approximately \$17 per capita, according to Dr. Guidotti. Medical services are provided without charge to eligible patients. Prescriptions are filled at cost by the center's pharmacy.

New and Developing Elements In Public Health Programs

That the dimensions and characteristics of public health are fluid and ever-changing is well illustrated in the foregoing summaries of major papers. By way of further illustration are the following summaries dealing with a miscellany of topics ranging from rheumatic fever to home safety and a critical examination of the health officer's job.

Test Indicates Absence Of Rheumatic Fever

Reporting that a low antistreptolysin-O (AST-O) serum level is highly reliable as a single diagnostic index of the absence of active rheumatic fever, Nell F. Hollinger, Ph.D., assistant professor of public health, University of California, said that if an AST-O serum level of 50 or less Todd units is obtained repeatedly for a child with a clinical diagnosis of active rheumatic fever, re-evaluation of other medical findings is indicated.

Dr. Hollinger reported the results of a 5-year study of the serums of 6,332 rheumatic and nonrheumatic children. Well children, or those with illnesses other than rheumatic fever, were grouped as nonrheumatic children.

Just as a negative tuberculin reaction confirms the absence of active tuberculosis, Dr. Hollinger said, a negative reaction to the antistreptolysin test might prove to be of considerable clinical worth in indicating absence of active rheumatic fever.

Determination of AST-O is a simple serologic procedure, reliable within accepted serologic limits, according to Dr. Hollinger. AST-O is

the antibody of streptolysin-O, a streptococcal product, and is present at some time in the serum of at least 90 percent of those who have had streptococcal infections. The antigen, streptolysin-O, is used to test for the presence of the antibody AST-O. The Todd unit of anti-serum is used as an arbitrary standard to test the neutralizing of new lots of antigen, she explained.

Clinical Values

Other significant conclusions reported by Dr. Hollinger include:

AST-O values presented in this study and others published over a 20-year period show that only 0.82 percent of 1,339 individuals with active rheumatic fever would have been misclassified as nonrheumatics if 50 or less Todd units were used as the diagnostic exclusion index.

A high AST-O serum level, over 250 Todd units, was found to be a misleading guide when used as a single diagnostic index of the presence of active rheumatic fever. On the basis of such an index, 19.4 percent of 5,135 nonrheumatics would be misclassified as active rheumatics; and 42.5 percent of 197 children with active rheumatic fever would be misclassified as nonrheumatics. A higher AST-O serum level of over 800 Todd units would be even more misleading since 88 percent would be classed as nonrheumatics; and 5 percent with illness other than active rheumatic fever would be misclassified as active rheumatics.

No universal pattern of AST-O serum levels was obtained for AST-O values tabulated as normal (well children), active RF (for children with active rheumatic fever), or clinic-nonRF (for children with illness other than active rheumatic fever). With the exception of normals for Texas, 30 percent of normal and clinic-nonRF AST-O values

for California, Colorado, North Carolina, Texas, and Vermont were found to be 50 or less Todd units.

Believe Hospital Contacts Spread Resistant Strains

Urging a halt to the practice of indiscriminate administration of antibiotics for a host of minor illnesses, three University of Illinois epidemiologists reported their observations on the epidemiological spread of antibiotic-resistant staphylococci among hospital patients, their contacts, and hospital personnel.

Presenting the report were Harry F. Dowling, M.D., professor and head of the department of medicine; Mark H. Lepper, M.D., associate professor, department of preventive medicine; and George G. Jackson, M.D., assistant professor of medicine and preventive medicine of the University's College of Medicine.

"The number of antibiotic-resistant strains in a given segment of the population presumably increases with the number of individuals who have received antibiotic therapy," they explained. "It would be profitable to explore techniques of managing patients under treatment with antibiotics so as to prevent as much as possible the spread of resistant strains via hospital personnel to other patients."

The investigators noted that the appearance of resistant strains has followed treatment with penicillin, but "often, perhaps more often, has been due to the spread of resistant strains to hospitalized patients from other patients and from attendants."

Cultures Studied

Drs. Dowling, Lepper, and Jackson investigated the sensitivity to aureomycin and penicillin of the staphylococci strains present in the noses and throats of patients discharged from the Municipal Contagious Disease Hospital, Chicago. Cultures were taken from the patients' household contacts and from

up for health protection of troops for possible assignment outside the country became the basis of a syllabus for public health officers in training for civil affairs.

Much early work of a public health nature in liberated areas was done by nonmedical health officers and engineers, he said. Even now, in reserve units, it is questioned whether enough medical officers in proper grade can be found to lead public health teams, he added.

World War II Experience

"We had only a hazy picture of the situation in occupied countries in late 1943," he said. "We were told that over a quarter of a billion people of varied cultural patterns, some enslaved for years, with millions virtually homeless, had been constantly subjected to pestilences, or to threats of epidemics of typhus, and bore emotional scars. They were reported to be either starving or hungry, and experiencing magnified problems of maternity and infancy, of tuberculosis and mortality from many causes.

"The military job in working with those unfortunate people had as a primary focus the military necessity to keep supply lines and communications open and to prevent disorder," he continued.

Dr. Hiscock added: "In fulfillment of this mission, efforts were aimed to help the people of liberated countries to help themselves in getting on their feet, with the idea of turn-over of military responsibility at the earliest practicable date."

As part of the public health program, the War Department established a policy to provide supervision of communicable disease control, of maternal and child health measures, of home and hospital nursing services, and for emergency care of sick and injured, he said.

Adequate Personnel

"Qualified personnel is of more significance than the form of organization. There is no single formula for each activity or region; and only

a flexible pattern with basic policies, principles, and techniques can be prescribed in advance. Detailed information concerning each country and region, implemented by practical guides as background, together with brief directives and essential supplies comprise the initial armamentarium required by the qualified civil affairs public health administrator," he said in quoting from a personal memorandum written in 1944.

Current manuals on military government regulations, Dr. Hiscock said, recognize that safeguarding the health of civilians and of occupying troops is vital to reestablishing a war-torn nation.

Health Officer's Job Needs Redefining

Public health activities should follow the needs of the times, and health officers should redefine their place in the community, said Berwyn F. Mattison, M.D., commissioner of the Erie County Department of Health, Buffalo, N. Y.

The definition of the health officer's field of a few decades ago no longer suffices, Dr. Mattison stated. Redefinition is needed to clarify health problems, the techniques for attacking these problems, and the effectiveness of the attack.

"More field studies are needed to establish quantitative relationships between disease and social factors such as age, race, sex, occupation, and economic status," the speaker continued. These factors and their impact on community disease patterns are the health officer's counterpart of the clinician's measurement of a patient's pulse, blood pressure, and basal metabolism, he said. He stated that much of the necessary information is available and that more attention should be given to the data and to their relationship to health and disease.

Barriers Against Disease

Four types of community-wide barriers against disease are avail-

able, the speaker stated. He described these barriers as physical—water filtration, milk pasteurization, air pollution control, and improved housing; physiological—widespread immunization programs, better nutrition, and fluoridation of water supplies; epidemiological— isolation, quarantine, vector eradication, and early case control; and educational—accident prevention, information leading to prevention and early recognition of heart disease and cancer, and promotion of health habits leading to improved physical, emotional, and mental efficiency.

Less emphasis on communicable disease control and more emphasis on positive programs relating to accidents, heart disease, cancer, diabetes, and the degenerative diseases of the elderly are needed today, Dr. Mattison said. More emphasis and less lip service should be given health education, the physician continued. The health officer should understand, direct, evaluate, and take full responsibility for this part of his program and, in addition, should participate actively in community activities, he stated.

Community Leadership

The health officer can provide leadership in his community by working actively for health councils or health committees in councils of social agencies, by teaching at professional, secondary, and elementary school levels, and by seeing that the subject of community disease and public health are well presented, according to Dr. Mattison. This cannot be accomplished, he said, on a 5-day, 40-hour week. "The best-trained health officer is of little value to his locality if his specialized skills are not readily available."

By developing standards for community and service record analysis that will be comparable for all communities, "we should be able not only to justify our current activities but to prognosticate changes in emphasis for the future," the health officer concluded.

Techniques in Health Statistics And Records Management

Methods of following records of veterans to determine the outcome of their disease experience and the technique of covariance were subjects presented at sessions of the statistics section of APIIA and the Biometrics Society. At joint sessions of the statistics section, the American Association of Registration Executives, and the American Association of Medical Record Librarians, panel discussions were held of the Census Bureau's post-enumeration survey, a survey of population trends, and the role of the medical record librarian in public health statistics.

Record Follow-Up Methods Developed for Veterans

The techniques developed in a pilot study, conducted for the Veterans Administration in 1948-50 by the Committee on Veterans Medical Problems, National Research Council, provide an efficient and systematic basis for exploiting the unique opportunities for record follow-up in the vast medical experience of armed forces personnel and veterans, reported Bernard M. Cohen, Ph.D., a statistician on the committee.

The committee's program was developed in two parts, the first being clinical studies. The second was record studies, which employed large samples to discover through existing records and by questionnaires facts of mortality, survival, hospitalization, and disability.

The pilot study collected considerable information on tracing and locating resources and on the nature

and value of the facts they can supply, Dr. Cohen said. These data were analyzed to gain more insight into the factors that enhance success in follow-up and to examine questions of completeness, validity, and bias.

He pointed out that in establishing rosters for study, identification of individuals represents a special set of problems. Usually, he said, service serial numbers are received without names, or names without numbers. For further processing, both are required, as well as confirmation that the individual received the diagnosis in question. When follow-up is initiated, files permit further verification of name, serial number, and often diagnosis.

A substantial portion of the observations sought came directly from the Veterans Administration, and the agency also provided most of the leads that resulted in successful tracing. Such additional resources as the Retail Credit Company, the American Red Cross, the Army, other Federal agencies, and private organizations were also used. A questionnaire to those located was especially useful in confirming current survival, in uncovering a few cases of wrong identification, in providing information on hospital admission not federally financed, and in indicating in general terms the health and work status of respondents.

Major Findings

According to Dr. Cohen's summary, the study showed that:

Satisfactory rosters can be defined for a wide variety of conditions and environmental hazards. The six rosters used included a syphilis group; Hodgkin's disease and scarlet fever groups, representing almost the extremes in morbidity and mortality expectations; diabetes and ulcer

groups; and a control group. The syphilis group was from World War I; the others, from World War II.

Identification by matching name, service number, and diagnosis can be accomplished in 96 percent of the cases.

Mortality and survival status can be determined for 99 percent of those identified. This percentage was demonstrated for World War II men approximately 4 years from date of diagnosis. For World War I men, the percentages decreased as the numbers of years from date of diagnosis increased, the lowest percentage being 89.7 after 30 years.

Data on hospitalization can be obtained for an estimated 94 percent of admissions. Veterans Administration records supplied 86 percent of the total admissions reported; the questionnaire, 73 percent.

Veterans Administration disability ratings can be obtained for every case; the veteran's own report of his work status, for 86 percent of the survivors. Comparison of VA disability ratings with clinical investigations of the patient's working capacity at the time of follow-up examination (part of clinical studies also conducted by the committee) indicates that the VA ratings can be used as rough measures of the disability aspect of prognosis.

Post-Enumeration Survey Checks Census Accuracy

The post-enumeration survey of the Census Bureau was described as a quality check on the accuracy of the 1950 census by William N. Hurwitz, M.A., the bureau's chief statistician.

If the major national aggregates for population, housing, and agriculture were the only characteristics to be measured, sample estimates would be more accurate and less costly than a census, Mr. Hurwitz explained. But a census is justified by the data it provides for small geographic areas or for cross-classifications of relatively few people, he said.

As a sample, the monthly current population survey could have been used as a concurrent quality check on the accuracy of the census, but this might have been construed as a "whitewash," and risk loss of public acceptance, he pointed out. Too, there was a possibility that comparing census and survey information for identical households might "condition" results, he said, leading to understating the differences between the census and the sample. As it was, a current population survey, conducted during the census period, checked on only one characteristic—the labor force participation of the population—a changing attribute which could not have been checked following a census, he said.

Post-Enumeration Survey

As a post-census survey, the PES checked on census accuracy in: coverage, age and income distribution, pattern of educational attainment, tenure status of dwelling units, and uses of farm acreage, Mr. Hurwitz reported. It sought to determine if the additional cost of discovering errors were justified, he indicated.

Steps were taken to improve the quality of the PES over the census: the best qualified interviewers and supervisors were trained intensively; they were paid hourly rates to avoid report padding or omission of isolated households; they were instructed to select the best respondent in a household rather than the available respondent, he continued.

PES measured errors in the recording of data and errors of undercoverage and overcoverage. "Any fears that errors of overcoverage due to padding might be substantial were not well-founded for they amounted to less than 0.1 percent of the total people enumerated in the population census," Mr. Hurwitz stated. "This emphasizes the importance of using objective methods for studying sources of errors, rather than relying on impressions," he said.

According to the PES, the net omission rate of persons from the census in enumeration districts

where they should have been enumerated was only 1.4 percent plus or minus 0.2 percent, or about 2 million people plus or minus 340,000, he also stated. "As between urban and rural classes, the under-enumeration seems to be greater in the very large cities and the more rural areas," he added.

Checking the PES

By "checking the check," census statisticians learned of errors in designing PES and in processing results. Interviewers had missed dwelling units. The numbers of missed persons classified by age did not agree with other evidence, he reported. For example, PES findings for missed children under 10 did not agree with an analysis of birth and death statistics for the period 1940-50, he said.

New techniques of treating future under-enumeration problems can come from knowing that about two-thirds of the persons erroneously omitted from the census were in households never included. About a third were missed within enumerated households, mostly among nonmembers of the immediate family, he said.

Mr. Hurwitz described the introduction of "record checks"—using income tax returns, social security records, earlier census reports, industry wage reports, Veterans Administration records to get evidence on the comparative accuracy of response in the PES and the census. "Presumably more accurate information is contained in such records," he stated. All dubious matches are discarded and the balance of matched records is used to draw inferences about errors.

Analysis of Covariance In Analytical Surveys

The analysis of covariance is proposed by B. G. Greenberg, Ph.D., associate professor of biostatistics, University of North Carolina School of Public Health, as a superior alterna-

tive to the usual "adjustment" (for age, sex, etc.) methods used in public health and vital statistics.

The statistical technique is derived from the statistics used in biological and agricultural experiments. Items for which adjustment is usually made are called covariates. Covariance analysis is an extension of regression techniques, associated with the analysis of variance, he said.

According to Dr. Greenberg, the major advantage of the covariance technique is that it enables the researcher to use data more fully. For example, the common adjustment techniques, as for age, require setting up arbitrary groupings even though the data may really be continuous. It is also possible to make proper statistical significance tests using the covariance technique, while there are difficulties in significance testing with adjusted data.

Balancing Technique

Dr. Greenberg also discussed a technique for achieving some of the results given by covariance analysis through balancing of the individuals in an experiment with respect to the covariates. Generally, in public health problems, balancing, or matching, does not achieve results as good as covariance analysis, he said.

He described a development showing that if the study consists of "less than 10 subjects on two treatments, a slight gain in efficiency may be obtained by the technique of balancing." For larger sample size there is little or no gain.

Some limitations in the use of covariance analysis were also discussed by Dr. Greenberg. In addition to the usual assumptions underlying the analysis of variance which are also the assumptions underlying the usual t-test, covariance techniques introduce three further assumptions: linearity of the relation between the covariate and the variate being investigated; equality of regressions in the two groups being studied; uniform variances in the variate studied at different values of the covariate, the usual assumption

of equality of variances in regression problems.

Extension of covariance analysis to more than one covariate was outlined by Dr. Greenberg.

Population Data Valuable In Determining Needs

Recognizing the importance of population data to public health departments, as a means of determining community needs for health services and as the denominator for the computation of vital rates, Mortimer Spiegelman, an associate statistician of the Metropolitan Life Insurance Co., presented a brief survey of population characteristics and trends to a joint session of the statistics section with the American Association of Registration Executives.

Among the points he noted were these:

Age—Perhaps the most significant change during the last decade was the great increase in the number of children, resulting from the war and postwar upsurge in birth rate.

The age group 5 through 19 years increased barely 2 percent between 1940 and 1950, but the present decade will see an increase of about 30 percent.

The age group 20 through 44 years will probably increase by only 2 percent by 1960, but after this date, the group will grow rapidly. Another upswing in the birth curve is expected then.

The population group aged 45 through 64 years will increase by about 18 percent from 1950 to 1960; the number in the age group 65 years and over is expected to increase by about 25 percent.

Sex—At ages 45 and over there were 97 females for every 100 males in 1940, but in 1950 there were 105 females per 100 males. By 1960, the number may mount to as high as 113, thus increasing the problems resulting from widowhood and dependency.

Family—A tendency toward earlier marriage is evidenced by the

increase in the percentage of girls aged 18 and 19 years who are married—from 22 percent in 1940 to 32 percent in 1951.

There were 26 percent more married couples in 1951 than in 1940. The trend toward an increase in the number of families (all groups of two or more related persons living together) and in the number of households and a decrease in the average size of families and of households is likely to continue. However, there is some indication that the long-term downward trend in the average size of completed family, generally defined as the number of births per mother of completed fertility, may have been halted.

Labor force—Industrial health services must be geared to the needs of a growing labor force, an aging labor force, and one that includes an increasing proportion of women workers.

Income—The average family income in 1950 was \$3,300, over 25 percent greater than in 1945. In general, a high average income means not only a better state of health, but also a higher grade of medical and hospital care. Thus, the health department can give proportionately less effort to communicable disease problems and more to chronic diseases.

Education—The task of public health education is great, but the job is being speeded by the rising educational level of the American people. From 1940 to 1947, the proportion of persons 21 years old and over who had completed secondary school rose from one-fourth to more than one-third, and the outlook is that the proportion will rise to more than one-half by 1975.

Migration—The movement of the population to urban places is continuing, bringing an increasing proportion of the population within range of the activities of the public health department. The accompanying shift of the urban population to suburban areas has, however, required an expansion of public health activities.

Urges More Censuses

One of the discussants of this paper, Henry S. Shryock, Jr., Ph.D., assistant chief, population and housing division, U. S. Bureau of the Census, maintained that more frequent population censuses seem the only real answer to community needs.

Dr. Shryock also added a few supplementary facts regarding national population characteristics. He noted that the 2-percent increase cited for children aged 5 through 19 years marks some very divergent changes among the various ages included—an increase of about one-quarter for those aged 5 through 9 years; a decrease of about 4 percent for those aged 10 through 13 years; and a decrease of about one-eighth for those aged 10 through 19 years.

He also mentioned that the marriage rate leveled off in 1952.

Role of Hospital Librarians In Public Health Statistics

The forces bringing hospitals and health departments closer together were noted in a panel discussion of the role of the medical record librarian in public health statistics. This session was moderated by William Haenszel, M.A., director of the bureau of vital statistics, Connecticut State Department of Health.

Responsible for this closer producer-consumer type relationship between hospitals and health departments is the increasing amount of public health data that is available only from hospital records, the participants indicated. The growing practice of locating health department offices adjacent to or even in hospital buildings was pointed to as a visible sign.

Participants in the panel discussion at a joint session of the statistics section, the American Association of Registration Executives, and the American Association of Medical Record Librarians were: James G. Harding, M.H.A., superintendent, Cleveland Clinic Hospital, Marjorie R. Quandt, B.A., director, medical

record department and school, Wesley Memorial Hospital, Chicago; Matthew Taback, A.M., director, bureau of biostatistics, Baltimore City Health Department; and M. Loyola Voelker, B.S., director of medical records section, Public Health Service Hospital, Baltimore.

The panel pointed out, however, that public health statistics are also the concern of hospital associations, medical societies, voluntary health agencies, and schools of medicine and public health. It was stressed that health departments have the responsibility of integrating their requests for hospital data with those of other organizations to ease the burden placed on hospital administrators and record librarians.

Each year, the proportion of births and deaths occurring in hospitals continues to grow in all sections of the country, making the hospital the source of more of the birth and death certificates filed. In the control of chronic diseases, health departments require data now available only in hospital records. With the breaking down of the boundaries between preventive and curative medicine, hospital data will become increasingly important to health departments, the panel brought out.

Clearance of Reports

To achieve completeness and accuracy of reporting, it was suggested that the medical record librarian review and clear all reports submitted to outside agencies. The medical record librarian should be able to establish controls on the receipt of all requests for information, to follow up on their disposition in compliance with hospital practice, and, especially, to check on the quality of information furnished, it was stated.

Although the librarian cannot be expected to obtain all information, it was repeatedly stressed that one of her prime functions was to edit and spot check the reports for accuracy and maintain their quality.

The need for a clearing center was highlighted by a study of the record-keeping procedures in Baltimore hos-

pitals for completing the birth certificate medical supplement. It was found that one or a combination of four types of personnel—obstetrical secretary, resident, or nurse, and attending physician—performed this job. None of these persons had a primary interest in record keeping. Furthermore, the turnover of nurses in residence and the haste of the attending physician contributed to an instability of medical record keeping.

Panel Suggestions

During the discussion, the following suggestions were made:

1. Close cooperation between public health statisticians and medical record librarians is needed. National organizations should appoint committees for combined exploration of their problems, but most of the work should take place on the local level. Local organizations should sponsor workshops and training institutes. Health department statisticians should visit the hospital personnel.

2. Since the academic statistical training of medical record librarians is sketchy, health departments might attain long-run benefits by sponsoring in-service training for medical librarians in elementary statistical principles.

3. State health departments might find it profitable to employ medical record librarians as consultants to assist local health departments in strengthening liaison arrangements with hospitals.

4. Bureaus of vital statistics should send requests for additional clarifying information on hospital births and deaths to the medical record librarian rather than directly to the physician.

5. Health departments should supply hospitals with tabulations and lists of births and deaths occurring within individual hospitals. So far, transmission of data has resembled a one-way street. Tabulation of data of interest to the hospital would stimulate its interest in seeing that the health department receives needed data.

6. A medical record librarian

should lead in educating the medical staff on the importance of reports submitted to health departments by means of orientation lectures to residents and interns, participation in the medical record meetings, and informal instruction.

7. The general acceptance of uniform standards among States on reports required from hospitals, would benefit operations.

8. Health departments should take the initiative in getting together with other users of hospital data to eliminate duplications from their requests and to agree on standard definitions of terms. They should give advance notice of their requirements for an ensuing year and eliminate reports no longer useful or productive.

Hospital Stay Tables Similar to Life Tables

Consideration of some of the inadequacies and limitations of current indexes of hospital stay has suggested the adaptation of life table methodology to hospital statistics, declared Morton Robins, M.P.H., chief, and Rose Sachs, statistician, biometrics section, department of medicine and surgery, Veterans Administration.

The length of stay of patients in hospitals is a major concern of hospital administrators and statisticians, they pointed out. Hospital stay tables similar to life tables in concept and form are designed to present a dynamic and integrated picture of both the hospitalization requirements and the discharge experience of a group of admissions at significant points in time subsequent to their admission.

Outlining two methods of deriving hospital stay tables, they noted that these tables can usually be accomplished within the framework of existing hospital records systems. The employment of hospital stay tables and other biometric techniques can do much to improve and extend the utilization of hospital statistics, they concluded.

Rehabilitation in the Hospital

By HOWARD A. RUSK, M.D.

IN THE PAST, the physician too often has thought only about the physiological and clinical aspects of a patient's disability. The vocational counselor too frequently has considered only the physical skills which could be utilized vocationally. Between the completion of medical care and the beginning of vocational training, however, there is a wide area through which most physically handicapped persons must go. In this area lies the physical retraining in skills necessary for carrying on the activities inherent in daily living and common to all types of work.

Except in a few isolated instances, the physically handicapped person must be retrained to walk and travel, to care for his daily needs, to use normal methods of transportation, to use ordinary toilet facilities, to apply and remove his own prosthetic devices, and to communicate either orally or in writing. These are such simple skills that they are frequently overlooked, but the personal, vocational, and social success of the handicapped person is dependent upon them.

Some outstanding rehabilitation programs in various parts of the world have demonstrated that rehabilitation to the point of self-care and even to full or limited employment is possible

for many of the chronically ill who have been hospitalized for long periods. In most of our hospitals, however, the patient receives few services of this type. Hospitals complain that the chronically ill are responsible for their overcrowding, but they do little to provide the retraining services that will permit many of these patients to leave the hospital.

Survey of Hospital Rehabilitation Services

In 1951, the Commission on Chronic Illness in cooperation with the American Hospital Association sent out questionnaires to approximately 2,600 general hospitals of 50 beds or more to learn more about the problems of caring for long-term patients in general hospitals. Hospitals were asked if they had an organized rehabilitation service. For survey purposes "an organized rehabilitation service" was defined as a service which (a) studies patients with residual handicaps or disabilities due to illness or accident and (b) provides training and therapy to help the patient to adjust to, compensate for, or overcome the disability.

Among the first 1,600 hospitals responding, only 65 reported that they operated organized rehabilitation services. Only 18 of these reported that they had separate ward services with a specific allocation of beds for rehabilitation, and in many of these the services cannot be termed truly comprehensive. In the other 47 hospitals, rehabilitation patients were not segregated. Staffs ranged from those including full-time physicians specially trained in physical medicine and rehabilitation, physical therapists, occupational therapists, speech therapists,

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vocational counselors, social workers, and others to those consisting of only a physical therapist and a social worker or a physician and a physical therapist. It was significant that 23 of the 65 hospitals reporting such services were hospitals of less than 250 beds.

Services in New York

The first comprehensive in-patient rehabilitation service in any general hospital in the United States and, to our knowledge, in the world was started at Bellevue Hospital in 1946 under the professional direction of the department of physical medicine and rehabilitation, New York University College of Medicine. Prior to the opening of this department, with a grant from the Baruch Committee on Physical Medicine and Rehabilitation, there was but one physician trained in this field on the staff of this 3,000-bed hospital. The hospital had a limited staff of registered occupational therapists, but physical therapy was administered primarily by unqualified "physical therapists" who had had little or no formal training. There were no registered physical therapists, no speech therapists, no rehabilitation counselors, no psychologists, no recreation specialists.

At present at Bellevue Hospital, there are 154 beds for rehabilitation: 69 beds for adults, 20 beds for children, and 65 beds for tuberculosis rehabilitation. At Goldwater Memorial Hospital, there are 200 rehabilitation beds; at City Hospital, 56 beds; at Kings County Hospital, 20 beds; and at Metropolitan Hospital, 30 beds.

The program will be expanded in the next 2 years by the opening of 22 beds at Fordham Hospital, which will be transferred to the Bronx Hospital Center when it opens. The number of beds at Queens General Hospital will be increased from 30 to 40, and the number at the Bird S. Coler Hospital will reach 400. The Bird S. Coler Hospital will then absorb the units now operating at Metropolitan and City Hospitals.

This expansion of rehabilitation services is a follow-up of the recommendations of the Hospital Council of Greater New York. In its master plan in 1947 the council suggested that 25 percent of the city's general hospital beds be allocated for convalescence and rehabilitation.

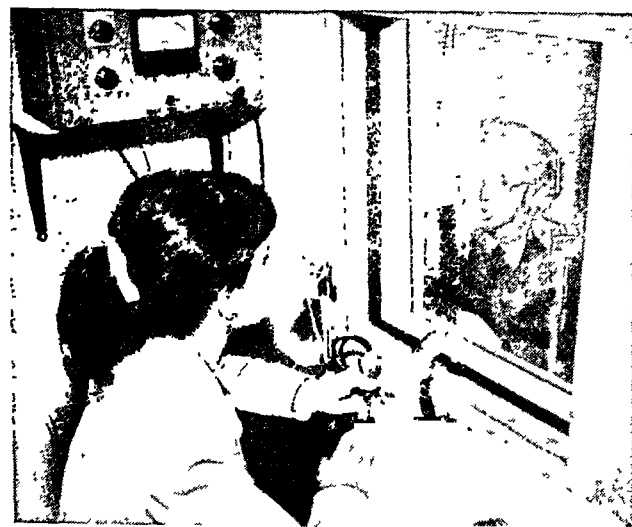
This would mean one such bed for each 1,000 of the city's population.

Organization and Operation

Physical medicine and rehabilitation in these hospitals is organized as a "service" department, usually operating in relation to the other hospital services in a manner similar to that of the X-ray or the laboratory department. For example, in Bellevue Hospital the rehabilitation service provides consultants for such other major services as fractures, pediatrics, surgery, and neurology. Its resident and visiting staff regularly make rounds with the resident and visiting staff of these services. Its staff may, *for example, see a patient in consultation before his leg is removed, indoctrinating him as to what he must expect, why he cannot keep his stump on a pillow, why he has to lie on his abdomen.* Medical responsibility during the period of definitive care, of course, rests with the initial or admitting service. As soon as the stitches are removed, the patient is transferred to a rehabilitation ward. At this time, the rehabilitation service assumes the major responsibility for his care, fitting of the prosthesis, and training in its use. The roles are now reversed; the surgical service has become the consulting service.

Prior to actual transfer of the patient to a rehabilitation ward, however, he attends one of the rehabilitation service's semiweekly evaluation clinics, where his problem is analyzed and discussed by all members of the staff—physical therapists, occupational therapists, nurses, vocational counselors, speech therapists, social workers, and psychologists—as well as the resident and visiting medical staff. The decision as to the feasibility of transferring the patient to the rehabilitation service is then made on the basis of the service's ability to contribute to his over-all physical, emotional, social, and vocational rehabilitation.

The rehabilitation services in New York City hospitals are unique in their scope of service, for they are among the few in the Nation, other than those operated by the Veterans Administration and some specialized facilities, which provide speech therapy, rehabilitation nursing, vocational counseling and job placement assist-



ance, psychological services, and a special therapeutic recreation program in addition to medical services, physical therapy, occupational therapy, and social services.

Economic Savings

Although it is difficult to estimate the financial savings to the city of such comprehensive rehabilitation programs, the 1951 experience of Goldwater Memorial Hospital gives some indication of how much these savings may be. In 1951, the 100-bed rehabilitation unit (increased to 200 beds in 1952) in this 1,500-bed hospital discharged 168 patients, some of whom went to other institutions but 91 of whom returned to their homes. Past experience indicates that each of these patients would have stayed at least one more year in Goldwater and many would have stayed much longer. At present hospital costs, the upkeep of these patients for one additional year would have totaled \$237,000.

Of the 91 patients returning to their homes, 12 were placed in full employment by the hospital's rehabilitation counselor working with other community agencies. An additional five patients were placed in part-time employment, and three were placed in sheltered workshops.

The amount listed above was not, of course, a net saving to the city, as the additional cost for physicians, therapists, and other personnel for the rehabilitation unit was about \$100,000 for the year. The additional cost cannot be charged entirely to the rehabilitation program, however, since these physicians and specialists also provided definitive services for the entire hospital.

Substantial savings accrue also from the lowered cost of care for patients who, as the result of rehabilitation training to the point of self-care, are transferred to the City Home and Farm Colony. The patient-day cost at the colony in 1950 was \$3.25 as compared with \$7.15 at Goldwater.

Similar economic savings were made through the organized rehabilitation units at Bellevue Hospital, which discharged 264 patients; at Metropolitan Hospital, which discharged 71; and at City Hospital, which discharged 135. The human value of these services, of course, cannot be measured by money.

Further evidence that this approach pays off economically and socially can be found in the

first year's experience of such a program on the chronic wards of Grasslands Hospital at Valhalla, N. Y. The original outlook for the majority of the 58 patients participating was continuous, indefinite hospitalization. Many had been in the hospital for months; some for years. At the end of the study, half of the group were walking without help and two-thirds had been discharged to their homes. Most significant was the fact that two-thirds required less than 60 days of rehabilitation training to make them self-sufficient.

Similar results have been reported at the Veterans Administration Los Angeles Center in a study of 105 patients, a typical group of elderly persons with declining or nonexistent economic potentials. All were physically disabled; a large number were chronically ill, many having histories of long periods of hospitalization prior to referral for rehabilitation. For various reasons, rehabilitation training was discontinued in 29 of the patients. Of the 76 completing their training, 34 were discharged to their homes, and the remaining 42 were transferred to the center's domiciliary unit, as they were ambulatory and capable of complete self-care.

From an economic standpoint, each of those discharged to their homes represents a saving of \$15.08 per day. Costs of maintaining those transferred to the domiciliary unit were reduced from \$15.08 to \$3.04 per day. Based on the 1950 Veterans Administration in-patient operating costs per day, the cost of providing care for the group of 105 patients at the time of their referral for rehabilitation was approximately \$1,583 per day. At disposition, the cost per day of caring for those remaining at the Los Angeles Center amounted to \$378, a reduction of over 300 percent, or an annual saving of approximately \$440,000.

In November 1950, a physical medicine and rehabilitation department was established at Gallinger Hospital in Washington, D. C., as a joint undertaking of the Public Health Service, the District of Columbia Office of Vocational Rehabilitation, and the District of Columbia Health Department. During the year prior to the formation of this new department, orthopedic patients spent an average of 55 days in the hospital. With the new program, the length

of hospital stay of orthopedic patients was reduced to 33 days, a saving of \$122,000 for orthopedic patients alone, based on a patient-day cost of \$12.50.

Experience has shown that the cost of additional specialized rehabilitation personnel largely offsets the over-all savings resulting from dynamic training programs for patients with chronic illness and rehabilitation patients who need fewer special services, such as drugs, dressings, operating rooms, X-rays, laboratory, and anaesthesia. The great saving results from the reduction in the length of hospital stay and the enabling of patients to return to lives of economic productivity or to care for themselves.

The Future

The hospital of today is being recognized

more and more as the focal point in public health activities. With the changing demands being placed upon it because of the growing incidence of chronic disease and disability, it must also play a more important role in the rehabilitation of patients. In the past, hospitals have concentrated almost solely upon the definitive aspects of medicine and surgery. If the hospital is to meet the changing health needs of the public, it must assume greater responsibility for all three phases of health: prevention, definitive treatment, and rehabilitation. As Bayne-Jones has said, ". . . they must become increasingly houses of prevention instead of houses of pity." The problems of chronic disease can be met only by the creation and utilization of abilities, not merely by the building of facilities.

The Visiting Scientist Program

The Public Health Service visiting scientist program established at the National Institutes of Health has been expanded to include research workers with demonstrated ability and specialized training. The plan, which permits the visiting research workers to conduct their investigations in the laboratories at Bethesda, Md., has been formalized in preparation for the opening of the Public Health Service Clinical Center.

The visiting scientist and the research associate are the two categories of visiting investigators. Requirements for the first category are a doctor's degree or its equivalent in training and experience, at least 6 years of postdoctorate research, and demonstrated ability in a specific research problem. Research associates must have the same training and experience, but not necessarily the same degree of identification with a specialized field.

Already among the guest scientists are Nobel Prize winners Albert Szent-Györgyi, Bernardo A. Hussay, and Otto H. Warburg. The first visiting scientist to be appointed under the new program is Dr. Horace A. Barker of the University of California, an investigator in the field of metabolism.

Occupational Factors in Lung Cancer

—A Preliminary Report—

By LESTER BRESLOW, M.D.

ONE OF THE MOST striking disease phenomena of the past two decades is the sharp increase in deaths due to lung cancer. The age-adjusted mortality rate for lung cancer in the United States climbed from 2.7 per 100,000 population in 1930 to 11.0 in 1948, a more than fourfold increase.

This higher rate is not a mere statistical artifact due to improved recognition of the disease. The lung cancer rate has increased two and a half times more rapidly among men than among women. It is highly unlikely that diagnostic improvements have been applied two and a half times more completely to men than to women. Furthermore, the increasing proportion of lung cancer found as a cause of death among autopsies in hospitals also attests to a real increase in this disease (1).

Lung cancer has become largely a disease of men. The age-adjusted mortality rate among males in the United States in 1948 was 17.5 per 100,000 population, nearly four times as high as the female rate of 4.6. Among males aged 45 to 64 years, lung cancer caused 3.1 percent of all deaths that year (2). If present trends continue, it will soon exceed tuberculosis as a cause of death among males in the United States.

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It is reasonable to assume that some change or changes in the environment account for this phenomenon. In such a hypothesis it is necessary to take into account the fact that our knowledge of carcinogenesis in man indicates a long latent period. Hence, an increase in the lung cancer mortality rate during 1930-48 may reflect environmental changes during the period 1900-40.

Evidence has already been accumulated which indicates an association between lung cancer and excessive cigarette smoking (3-6). Certain occupations, especially those involving exposure to chromate ore (7) and radioactive minerals (8), have also been implicated in the causation of lung cancer. However, the number of persons with such occupational exposures in the United States is relatively small.

Collection of Data

In an effort to get further data on the etiology of lung cancer, the California State Department of Public Health has investigated the occupational and smoking history of a group of lung cancer patients and of a control group.

The first group was composed of persons with histopathologically proven lung cancer in nine California hospitals. For every cancer patient, a patient of the same age, sex, and race admitted to the same hospital at about the same time for any condition other than chest disease or cancer was admitted to the control group. Thus, the lung cancer series and the control series were equated as to age, sex, and race. They were

Table 1. Number of patients with 5 or more years' exposure in randomly selected occupations among 408 lung cancer cases and 408 controls

Occupation	Lung cancer cases	Controls
Total.....	98	88
Hotel and restaurant managers.....	5	5
Bookkeepers and cashiers, except bank cashiers.....	5	2
Salesmen, real estate.....	4	7
Bartenders.....	5	7
Guards and watchmen, except crossing watchmen.....	9	15
Animal and livestock farmers.....	4	5
Gardeners and grounds keepers.....	6	11
Electricians, skilled.....	6	6
Brakemen, railroad, skilled.....	9	3
Drillers, extraction of minerals and construction, skilled.....	6	2
Route men, semiskilled.....	9	8
Construction occupations, unskilled.....	30	17

also roughly equated as to socioeconomic status since both groups contained the same proportion of patients admitted to county-indigent, Federal, teaching, and private hospitals.

Each patient was questioned about the type and amount of his smoking and was asked for a detailed occupational history. The scope of the occupational data is indicated by the fact that each interview covered the patient's life-long history, required from 1 to 3 hours, and was conducted by a qualified occupational analyst.

Analysis of Data

Preliminary analysis of the data for 408 lung cancer cases and 408 controls confirms the association between excessive cigarette smoking in lung cancer identified in previous studies.

Preliminary analysis of the data implicates several occupational exposures not previously identified. A total of 59 occupations were listed five or more times by either cases or controls, or both, with a history of at least 5 years' exposure. The 12 occupations listed in table 1 are a random selection from these 59.

The five occupations listed in table 2 were selected by the observations, first, that the number of lung cancer cases exceeded by several times the number of control cases, and second,

that a common exposure among the five occupations appeared to be certain metal fumes and particles. The welders were arc and acetylene welders. The cranemen and derrickmen specified in their histories that they had worked on operations involving molten metals with consequent exposure to accumulated metal fumes. The majority of the firemen had worked in connection with either ships' boilers or industrial boilers. Although there were approximately equal numbers of miners with exposure to only gold and silver in both the group of cancer cases and the control group, the number of miners exposed to copper, lead, or zinc mining in the lung cancer group exceeded the number in the control group, indicating some association of this occupation with lung cancer. Likewise, tool dressers and drillers in oil-drilling operations appear more frequently in the series of cancer cases.

Although the numbers involved for the individual occupational groups are small, tests of significance showed that for cranemen and derrickmen exposed to metals the differences observed between cases and controls would be unlikely to occur by chance ($p < .05$) in repeated samples from the same population; for firemen (marine and stationary boilers) the observed differences also would be unlikely to occur by chance ($p < .01$).

Differences observed for welders, metal miners (copper, zinc, and lead), and tool dressers and drillers could occur by chance more frequently than the generally accepted level of statistical significance ($p > .05$).

Table 2. Number of patients with 5 or more years' exposure in selected occupations among 408 lung cancer cases and 408 controls

Occupation	Lung cancer cases	Controls
Total.....	40	8
Welders.....	8	2
Cranemen and derrickmen, exposed to metals.....	5	0
Firemen, stationary and marine boilers.....	11	1
Metal miners, copper, lead, and zinc.....	9	3
Drillers and tool dressers, oil.....	7	2

It is extremely unlikely that the observed difference for the total group would occur by chance ($p < .0001$); hence it is deemed to be significant.

Conclusion

This exploratory study was intended merely to identify occupations that have a suggestive association with lung cancer. The five occupations shown in table 2 are of this character. These occupations and the individuals so employed should be studied intensively in order to determine the exact nature of the relationship to lung cancer.

Suggestive differences have also been noted in this preliminary analysis with respect to other occupations; these likewise deserve further study.

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Traveling Sanitation Classes

HAWAII. Usually students have to travel to the classroom, but in the school for food service personnel conducted by the division of sanitation, Territorial Department of Health, the classroom is brought to the students.

A sanitation education representative packs up his demonstration materials and conducts the course in a restaurant if it has more than five employees. Time for class is arranged for the employees' convenience to assure attendance, but managers or owners are required to be present also. Other classes are held in neighborhood restaurants for those places employing less than five food handlers.

Each restaurant receives an official inspection sheet and a printed form for posting on a bulletin board. Any employee discovering an insanitary condition inserts the nature of

the defect, recommendation for correction, his name, and date on the form. If the personnel and management are alert, and the sanitarian fails to find any defective conditions on his next inspection, the proprietor and employees win the game. Through the school and its encouragement of self-inspection, food service employees have become more conscientious about their work and are eager to seek advice, information, and suggestions.

Mercurial Diuretic Service

SHELBY COUNTY, TENN. The Memphis-Shelby County Health Department has proved the value of a nursing service for injecting mercurial diuretics into cardiac patients in their own homes. The program also affords opportunity for education in cardiovascular disease. It is planned to conserve the patient's energy and result in less frequent hospitalization and less crowded clinics.

At the present time, 65 percent of the nursing load is carried by district public health nurses. Registered practical nurses visit patients

in areas where a heavy concentration of cases makes it difficult for the district nurse to assume this emergency-type service.

Each cardiac patient is carefully evaluated at an out-patient clinic prior to referral to the nursing staff. Specific written instructions on medication accompany the referral. The majority of patients receive the injections weekly although treatment intervals may vary from daily to monthly. Patients return to the clinic for reevaluation whenever necessary.

The service was initiated in March 1950 by request of the Medical College of the University of Tennessee and the John Gaston teaching hospital. A brief preliminary institute on cardiovascular diseases was held by the medical staff of the college for the health department nurses. In the early experimental phase of the project, specialized nursing service was used with the idea of gradual absorption into the general program.

By May 1952, almost 800 patients were receiving the service, and more than 22,000 home visits had been made. Under supervision, the practical nurses have handled the service well.

Venereal Disease Contact Investigation

—A Combined Military-Civilian Program—

By NICHOLAS J. FIUMARA, M.D., M.P.H., JACK SEGAL, M.D., and JACK JOLLY, B.S.

THE CONTROL of venereal diseases among military personnel is a joint function of military and civilian authorities. A military program aimed at the prevention and control of venereal diseases will be effective only to the degree of joint participation of the civilian and military partners. Each group must assume responsibility in certain areas, but the program should be integrated in its conception and execution. A brief review will delineate the areas of responsibility of both the civilian and military authorities.

Military Program

The activities of the armed forces may be conveniently divided into two phases—the program for prevention and the program for control of the venereal diseases.

Preventive Program

1. Education. The objective of this part of the program is not only to motivate the individual serviceman to avoid exposure but also to strengthen and reinforce his belief in the fundamental truths of decency and morality, to

the end that he may retain his own self-respect, attain a mature and balanced personality, and build a sound basis for marriage, family life, and constructive community life. The character guidance program has been devised to accomplish this purpose.

2. Prophylaxis. Mechanical, chemical, and antibiotic methods of prevention are available for those servicemen who, for one reason or another, expose themselves to possible infection. They fail to appreciate the inherent limitations and effectiveness of these measures. Because of the conditions under which they are used—the inopportuneness, the messiness, the alcoholic inhibition factor, the time factor—these and many other considerations, it is imperative to de-emphasize prophylactic measures as a major part of the preventive program.

3. Measures are taken to maintain morale through effective leadership, a thorough understanding of the over-all objective of the services (why we are fighting), a fair distribution of the work, proper job placement and utilization, and adequate recreation.

Control Program

Control measures are designed to detect and treat cases of venereal diseases as soon as possible after they are contracted. The control principles used by the military authorities are similar to those used in civilian practice:

1. Screening tests through periodic examination of the serviceman.

2. Voluntary reporting to a medical officer should a serviceman suspect that he may have acquired a venereal disease.

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3. Contact investigation, to elicit the names, addresses, and circumstances surrounding each exposure with all contacts and with those persons exposed by the patient, within the maximum incubation period of the disease, from date of onset of the patient's symptoms to the moment treatment could be expected to be effective (1). Contact investigation also aims at the re-education and orientation of the patient.

Complementary Civilian Program

The civilian program, like that of the military, can be divided logically into two phases—measures aimed at prevention and at control.

Preventive Program

1. The civilian community is responsible for seeing to it that by the time an individual has reached military age, he has, through proper home training, religious instruction, and community socialization, developed a mature and balanced personality and a self-disciplined character.

2. The repression of commercialized and clandestine prostitution is the responsibility of civil law enforcement authorities (2).

3. The civilian community should also provide an environment, during the off-duty hours of military personnel, which is not only safe and wholesome, but which integrates the recreational and social activities of the servicemen with those of the community's civilian components.

Control Program

1. Participation of the civilian health department in the military venereal disease control program implies that the former maintains and operates an efficient and well-ordered venereal disease control program. This should include adequate case-finding, diagnostic, treatment, and case-holding procedures for the venereal diseases for the civilian population (2).

2. Contacts of military personnel should be investigated with dispatch. Once these contacts have been found and examined, a report of their medical disposition should be forwarded without delay by civilian health departments to the proper military authorities.

3. Military personnel who are contacts of in-

fectured civilians should be reported to the appropriate medical commands of the military services, and the results of the medical examination of the named servicemen forwarded by the military authorities to the reporting civilian agency.

4. Civilian venereal disease control officers should actively participate in the work of the armed forces disciplinary control boards to safeguard the health, welfare, and morals of armed forces personnel.

Joint Program

These, in brief, are the general duties and responsibilities of both military and civilian authorities in their joint program for venereal disease control. Failure of one of the contracting parties to live up to his end of the agreement forecasts a pessimistic future for the military control program. However, there are times when, because of the exigencies of the moment, some of the services cannot be adequately carried out. Such a situation arose in Massachusetts. The demands of the United Nations in Korea, requiring the transfer of trained and key personnel to the front, left Fort Devens without trained venereal disease interviewers. As the rotation of men continued, this lack was sorely felt. Like many military stations in the United States, the venereal disease rate at Fort Devens did not require the full-time services of a venereal disease interviewer. However, there was no question that the military venereal disease control program would profit from the services of such an individual. Therefore, the services of three well-trained nurse venereal disease epidemiologists from the Massachusetts Department of Public Health were offered and accepted. These nurses carry out a specialized program in venereal disease control and operate from venereal disease clinics located approximately 10 miles from the post. From these clinics, the epidemiologists carry out their venereal disease control activities in a given number of communities surrounding their clinics. This pattern exists throughout the State, where there are 24 clinics located in general hospitals (with 3 exceptions), each with an epidemiologist, so that complete coverage of all communities in the State is assured.

The experiences of the Fort Devens hospital since September 1951, when the services of the epidemiologists were made available, to February 1, 1952, a period of 5 months, are summarized in this paper. The station hospital still has the services of these nurses and more complete reports will be given as data are accumulated.

Methods

A simple but effective system of contact investigation has been set up. The out-patient department facilities of the station hospital at Fort Devens have been so arranged that patients referred to the venereal disease clinics or voluntarily reporting for examination are seen in the morning. After an appropriate examination, the necessary laboratory tests are performed. Reports of the laboratory examinations are ready by 1:00 p. m., in time for the afternoon clinic. Patients who were examined in the morning are requested to return in the afternoon, when, with all laboratory reports available, a definitive diagnosis can be made. Once the diagnosis has been established and confirmed by laboratory tests, the patient is interviewed by the nurse epidemiologist in a private room at the clinic. The schedule for the nurses has been so arranged that, each afternoon 5 days a week, one epidemiologist is detailed for interviewing at the clinic. Two of the nurses report two afternoons a week, and a third at one afternoon session. If no patients are examined in the morning, the nurse on call for that afternoon is notified by phone, thus releasing her for other duties.

Function of the Epidemiologists

The epidemiologists have a threefold function. Their primary responsibility is to ascertain the identity and description of contacts, as well as circumstances surrounding the exposures, for example, place and date of encounter and exposure, and relationship of the contacts to the patient. This information is given to a corpsman, who transcribes it on the military epidemiological report forms (PHS-1421 VD) and routes copies of the form to the health departments of the States where the contacts are reportedly located, or to city health

departments when so indicated by military regulations.

The second responsibility of the epidemiologists, carried out during the interview, is to re-educate and reorient the patient.

Equally important is the third undertaking of the nurse, the proper indoctrination and individual training of the hospital corpsmen.

The names and addresses of all contacts are obtained whenever possible, regardless of whether they may be in Massachusetts or from other States or countries. The service is comprehensive. However, for contacts most likely to be found in Massachusetts, the nurse epidemiologists transcribe the contact data on Massachusetts forms in addition to the military reports. Copies of the Massachusetts epidemiological forms are sent directly to the epidemiologist in whose district the contact may be located, and the original copy, as well as the military forms, are sent directly to the Massachusetts Department of Public Health, division of venereal diseases. When complete identifying information is obtained, the data is immediately telephoned to the central office where it is the responsibility of the division staff to locate the appropriate nurse in the field and relay the information to her. The forms follow in routine fashion.

Such is the system which has been arranged—simple yet effective.

Results

During the period of January to August 1951, inclusive, a total of 175 cases of venereal disease was diagnosed at the United States Army Hospital, Fort Devens, Mass. There were 159 patients with gonorrhea and 16 infected with syphilis. Of the latter, 12 were in the primary or secondary stages (lesion syphilis) and 4 in the early latent stage. The corpsmen were able to elicit the names of 1.13 contacts per patient with gonorrhea and of 1.58 contacts per patient with lesion syphilis (table 1).

However, during the first 5 months of this study, September 1951 through January 1952, when infected patients were interviewed by the nurse epidemiologists from the Massachusetts Department of Public Health, division of venereal diseases, a total of 136 cases of venereal

disease was diagnosed at Fort Devens. Of this number, 113 represented cases of gonorrhea, 21 syphilis, and 2 granuloma inguinale. Of the syphilis patients, 13 were in the primary or secondary stages, 6 had latent syphilis, and 2 were in the late stages. The nurses were able to obtain 1.29 contacts per patient with gonorrhea; the contact-patient index for lesion syphilis was 3.46 (table 1).

Table 1. Results of contact investigation at Fort Devens, Mass.

Number of cases	Gonorrhea		Primary and secondary syphilis	
	Hospital corpsmen	Nurses	Hospital corpsmen	Nurses
Number of patients examined-----	159	113	12	13
Number of contacts named-----	179	146	19	45
With complete information-----	66	74	4	25
Percent with complete information-----	36.9	50.7	21.1	55.6
Found and examined-----	61	63	10	19
Percent found and examined-----	34.1	43.2	52.6	42.2
Contact-patient index-----	1.13	1.29	1.58	3.46
Epidemiological index-----	.33	.47	.17	.38
Brought-to-treatment index-----	1.31	2.44	.08	.38

¹ Includes 15 treated on suspicion.

² Includes 26 treated on suspicion.

Military Interviewers

Gonorrhea. The military interviewers were able to elicit identifying information on 179 contacts of the 159 patients with gonorrhea (table 1). The contact data were examined and it was concluded that complete identifying information had been obtained on 66 (36.9 percent). The information, whether complete or incomplete, was transcribed on the military epidemiological report forms and sent to the States in which the contacts were most likely to be found. As a result of the information furnished to the States, including Massachusetts, 61 (34.1 percent) of the contacts were found and examined. The epidemiological index was 0.33 since 53 of the contacts were found

to be infected. When the contact information was adequate, 56.1 percent of the contacts were located and examined in contrast to the 21.2 percent who were located when the contact data were incomplete.

Lesion Syphilis. There were 12 patients with primary or secondary syphilis and the military interviewers were able to obtain information on 19 of their contacts, a contact-patient ratio of 1.58 (table 1). The contact data were deemed complete or adequate in 4 (21.1 percent) and incomplete in 15 (78.9 percent) cases. The contact information was sent to the respective States and 10 (52.6 percent) of the contacts were found and examined, 5 in Massachusetts and 5 in other States. The epidemiological index was 0.17. When contact information was complete 75.0 percent of the contacts were located and examined in contrast to the 46.7 percent who were found when the information was incomplete.

Specialized Nurse Interviewers

Gonorrhea. During the period covered by this report the nurses interviewed 113 patients with gonorrhea and obtained information on 146 contacts, a contact-patient index of 1.29 (table 1). This is not very different from the 1.13 contact-patient ratio obtained by the military interviewers, and the difference between the two is not statistically significant. However, when the adequacy of the contact data and the number of contacts found and examined are studied, one finds a significant difference, for 50.7 percent of the contact information obtained by the nurses was complete and 43.2 percent of the contacts were found and examined. The epidemiological index for all States for gonorrhea was 0.47.

Lesion Syphilis. There were 13 patients with primary or secondary syphilis and the nurses obtained the names of 45 contacts, a contact-patient ratio of 3.46 (table 1). This is in contrast to a contact-patient index of 1.58 obtained by the military interviewers. The contact data were considered complete in 25 (55.6 percent) cases and incomplete in 20 (44.4 percent). These data were sent to the various States in the routine manner and 19 (42.2 percent) were located and examined. The epidemiological index was 0.38.

Table 2. Venereal disease contacts of military personnel at Fort Devens, Mass., investigated by the State of Massachusetts and by other States

Number of cases	Massachusetts								Other States							
	Gonorrhea				Primary and secondary syphilis				Gonorrhea				Primary and secondary syphilis			
	Hospital corpsmen		Nurses		Hospital corpsmen		Nurses		Hospital corpsmen		Nurses		Hospital corpsmen		Nurses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total cases.....	71	100.0	52	100.0	8	100.0	18	100.0	108	100.0	94	100.0	11	100.0	27	100.0
Complete information.....	10	14.1	14	26.9	0	0.0	6	33.3	56	51.9	60	63.8	4	36.4	19	70.4
Located and examined.....	31	43.7	37	71.2	5	62.5	11	61.1	30	27.8	26	27.7	5	45.5	8	29.6
Not infected.....	2	2.8	0	0.0	5	62.5	7	38.9	6	5.6	10	10.7	3	27.3	7	25.9
Infected.....	29	40.9	37	71.2	0	0.0	4	22.2	24	22.2	16	17.0	2	18.2	1	3.7
New case.....	14	-----	13	-----	0	-----	4	-----	21	-----	11	-----	1	-----	1	-----
Already under treatment.....	0	-----	0	-----	0	-----	0	-----	3	-----	3	-----	1	-----	0	-----
Treatment on suspicion.....	15	-----	24	-----	0	-----	0	-----	0	-----	2	-----	0	-----	0	-----
Not examined.....	40	56.3	15	28.8	3	37.5	7	38.9	78	72.2	68	72.3	6	54.5	19	70.4
Insufficient information.....	19	-----	4	-----	0	-----	1	-----	31	-----	14	-----	1	-----	2	-----
Cannot locate.....	21	-----	11	-----	3	-----	6	-----	21	-----	18	-----	3	-----	9	-----
No disposition.....	0	-----	0	-----	0	-----	0	-----	26	-----	36	-----	2	-----	8	-----

Conclusions

Contact interviewing is a highly specialized art requiring the services of well-trained personnel. Experiences of the Massachusetts State Health Department with the Fort Devens hospital have been very satisfactory. They suggest that other Army hospitals might well consider the advisability of a closer liaison with civilian health authorities, particularly if well-trained military interviewers are not available. More careful attention to contact investigation is needed.

Summary

This paper summarizes the basic principles of a military venereal disease control program. It emphasizes that adequate control measures must have complementary action on the part of civilian authorities. It further describes the unique experiences of a State health department in not only interviewing military patients

for contacts but also engaging in the training of military hospital corpsmen in the highly specialized art of contact interviewing.

The study points up the need for highly trained personnel in carrying out contact interviewing, by comparing the results of interviewing by relatively untrained versus trained people. The hospital corpsmen who have had little training in interviewing were able to obtain 1.13 contacts per patient with gonorrhea and 1.58 contacts for lesion syphilis. In contrast, the nurses obtained 1.29 contacts for gonorrhea and 3.46 contacts for syphilis. With the information supplied by the military interviewers, civilian health departments were able to locate 34.1 percent of the gonorrheal contacts and 52.6 percent of the syphilis contacts. On the other hand, information supplied by the nurses resulted in 43.2 percent of the gonorrheal contacts and 42.2 percent of the syphilis contacts being found in spite of the fact that no disposition has been reported on 24.7 percent of the gonorrheal contacts and 17.8 percent of

the syphilis contacts as compared with 14.5 percent of gonorrheal contacts with no disposition from military interviewers and 10.5 percent for syphilis contacts.

Of striking importance was the epidemiological index. From information supplied by the hospital corpsmen, the epidemiological index was 0.33 for gonorrhea and 0.17 for syphilis. In contrast, the epidemiological indexes from information supplied by the nurses were 0.47 for gonorrhea and 0.38 for syphilis.

One of the important points brought out in this study is the obvious necessity for the States to improve their contact investigational activities (table 2).

REFERENCES

- (1) Fiumara, Nicholas J.: Ten principles of VD contact interviewing. *J. Social Hyg.* 35: 322-327 (1949).
- (2) The Eight Point Agreement of 1948. *J. Ven. Dis. Inform.* 31: 199-200 (1950).

Public Health Training Courses

In the spring of 1953, refresher training courses in the principles and practices of laboratory diagnostic methods and field training courses in insect and rodent control will be offered by the Communicable Disease Center, Public Health Service.

Laboratory subjects will include general bacteriology, enteric bacteriology, tuberculosis, virus diseases, rabies, parasitology, medical mycology, veterinary mycology, and microbiology for public health nurses. Instruction covers lectures, laboratory exercises, demonstrations, audio-visual aids, and group discus-

sions. Laboratory training courses will be offered throughout 1953.

Laboratory personnel of State and local health departments, Federal agencies, and nonprofit institutions are eligible for the laboratory series. Applications should be submitted through the appropriate State health officer or, for Federal personnel, through the bureau or division chief, and forwarded to: Medical Officer in Charge, Communicable Disease Center, Public Health Service, Box 185, Chamblee, Ga., Attention: Laboratory Training Services. Requests for application forms and a bulletin

describing the 1953 training series should be sent to the same address.

Personnel in State and local health departments and the Public Health Service are eligible for the courses in insect and rodent control. Persons from other organizations will be accepted if facilities permit. Applications should be made through the sponsoring agency to: Medical Officer in Charge, Communicable Disease Center, Public Health Service, 50 Seventh Street NE, Atlanta 5, Ga., Attention: Chief, Training Branch.

Both series of courses are scheduled as follows:

Insect and Rodent Control

March 23-April 3: Rodent control.
April 6-17: Insect control.

April 20-May 1: Rodent control.
May 4-15: Insect control.

Laboratory

March 16-27: Laboratory diagnosis of virus diseases.

March 16-27: Laboratory methods in medical mycology—cutaneous fungi (part 1).

March 16-27: Laboratory diagnosis of tuberculosis.

March 30-April 3: Laboratory diagnosis of tuberculosis (directors' course).

March 30-April 10: Laboratory methods in medical mycology—subcutaneous and systemic fungi (part 2). NOTE: Part 1, cutaneous fungi course, or equivalent education or experience, is a prerequisite.

April 6-10: Laboratory diagnosis of bacterial diseases (directors' course).

April 13-17: Laboratory diagnosis of parasitic diseases (directors' course).

April 13-17: Laboratory diagnosis of rabies.

May 4-8: Microbiology for public health nurses.

The Public Health Training Program Of New York State

By FRANKLYN B. AMOS, M.D., M.P.H.

ANY STATE health department training program naturally should be based on the needs, problems, and public health organizations existing in that State. For this reason, it is desirable to review briefly certain pertinent facts about New York.

New York State, covering an area of about 50,000 square miles, has a population, according to the 1950 census, of 14,830,192, with 7,891,957 in New York City. In addition, there are 11 other cities in the State with a population of over 50,000. There are 57 counties, exclusive of the 5 counties fully within New York City, and 929 towns, 549 villages, and 51 cities under 50,000 population. Town and city government is relatively stronger than either village government or county administration with the exception of the few counties in the State which have adopted an optional form of strong county government permitted by legislative action in the last several years. State government is well organized and many governmental services are performed by law by the State.

Local health services are provided through various administrative patterns. Each town, village, and city is required to have a health

officer and may employ other public health personnel. Under permissive legislation, any county may establish a county health department, and if it does so, all towns and villages within such county become a part of the county health district. Cities within the county may and usually are included also. Fourteen county health departments are established, serving populations varying from 24,000 to nearly 1,000,000. Ten cities with a population of over 50,000 and located in counties without county health departments have full-time, well-staffed health departments. The remainder of the State receives its public health services from the employees of the towns, the villages, and the counties, supervised and supplemented by the staffs of the State district health offices, which may, in many respects, be considered as multicounty health departments.

According to a recent tabulation, there are 3,548 positions budgeted for public health professional workers in major categories, exclusive of those in laboratories and hospitals (see table).

History of Program

Since 1913, the State public health council has had authority to establish qualifications for certain public health personnel employed by the State or its political subdivisions. In 1921, the State civil service commission was established, with authority to stipulate minimum qualifications for all State employees in classified positions. Similar provisions for

Dr. Amos, director of the office of professional training in the New York State Department of Health, discussed his State's public health training program at the training conference of Region III, Public Health Service, Federal Security Agency, Washington, D. C., on August 12, 1952.

minimum qualifications for employees of counties, cities, towns, and villages were added at a later date so that by 1945 at least minimum professional qualifications were required of all public health workers.

Full-time public health professional positions in New York State, July 1952

Professional category	Total	Employing health department		
		State	County and city ¹	New York City
Physicians.....	227	76	59	92
Nurses.....	2,269	129	943	1,197
Dentists.....	39	4	3	32
Sanitary engineers.....	108	52	51	5
Other sanitation personnel.....	762	35	316	411
Statisticians.....	81	25	8	48
Nutritionists.....	41	9	4	28
Health educators.....	21	7	12	2
Totals.....	3,548	337	1,396	1,815

¹ Only the cities over 50,000 included unless part of county health department; New York City not included.

In 1932, the public health council established certain minimum qualifications for public health personnel. These included graduate academic training or practical public health experience, or both, for all full-time health officers and all public health nurses. It was felt then that provision of an adequate number of public health physicians and public health nurses to satisfy the needs demanded by these regulations could be made only by developing a State training program. Plans for a program of health officer training were developed and put into operation in 1934. Expansion of the program has resulted in the training of public health nurses since 1936, of statisticians since 1938, of nutritionists since 1945, of health educators since 1948, and of sanitation personnel since 1951. Training has been received by more than 100 physicians, 600 public health nurses, 15 statisticians, 8 nutritionists, and 20 health educators.

Present Scope

The training provided at any given time depends upon analysis and evaluation of the needs.

This is done annually prior to the submission of the training budget. Some training activities have been discontinued and others decreased or increased as the needs varied.

In general, all training may be grouped in two categories:

Preservice training which may be required for the person to be eligible for appointment to the beginning permanent position.

In-service training needed for the permanent appointee to remain qualified for the position or to become eligible for a more responsible or more specialized position.

The need for preservice training is determined by position vacancies, both present and expected, by the qualifications established for the position, and by the supply of qualified applicants for the position and of the available applicants for training. Determination of the need for in-service training requires an analysis of the public health programs, both as to content and knowledge available, and the education, aptitude, and ability of the permanent workers.

The current training program includes 38 separate and distinct training activities, not including the orientation program for all new public health workers, nor the clinical training conducted as a routine function in the hospitals, nor the on-the-job training constantly in effect through staff meetings, conferences, or short courses provided wholly within the department.

Fourteen training programs are for physicians. One provides a year's supervised experience and residency training approved by the American Board of Preventive Medicine. Another permits physicians to be sent, on stipend, to an approved school of public health for one academic year. Tuberculosis public health physicians are trained in a 14-month program which includes 6 months' clinical training in a tuberculosis hospital, 2 months' general experience in public health, and 6 months' specialized experience in tuberculosis control. Physicians may be trained for maternal and child health positions for a year at a school of public health supplemented by 6 months' planned experience in a local health department. One year of clinical training in tuberculosis is given to physicians to qualify them for beginning clinical positions in the State health department.

ment. Specialized training in rheumatic fever includes 1 year of clinical experience supplemented by a year in a school of public health. Training for physicians in laboratory work consists of 1 year of practical experience under close supervision which, when added to the qualifications the physician must have to enter such training, permits him to meet the requirements for director of a local laboratory. Clinical training in cancer, heart disease, or cerebral palsy can be given to physicians not employed by an official health agency but who will subsequently be contributing to official health programs. Short, formal courses in public health administration varying from 3 days to 2 weeks are provided for public health physicians. Short courses in clinical subjects such as poliomyelitis, tuberculosis, cancer, or heart disease are also arranged for this group.

The department aids in providing postgraduate medical education for the 30,000 private practitioners in the State in several ways. In a cooperative program with the State medical society, honorariums are paid to lecturers at local medical meetings and special short courses are arranged on the subjects of rheumatic fever and rheumatic heart disease, cardiovascular diseases, pediatrics, and obstetrics. In a joint program with the University of Buffalo School of Medicine, comprehensive postgraduate medical education is provided.

The provision of practical public health experience for a limited number of medical students is another important activity. Known as the junior public health intern program, it accepts 30 of the State's 900 medical students for 1 to 4 months' training. The students work under the immediate supervision of a well-qualified public health physician in the State health department or in a selected local health department. Their public health training is comparable to the clinical training at hospitals they receive while in medical school.

The single training program for dentists consists of a 2 weeks' course in children's dentistry for practicing dentists in the State.

Twelve of the training programs are for nurses. One consists of 6 months' supervised field experience with a general public health nurse. Another is an academic year in public health nursing, which leads to qualification as

public health nurse for field service. Further academic training of 1 year is provided for nurses who will be responsible for supervising or directing other public health nurses. Training in the care of premature infants and the newborn, in pediatrics, in cancer, in tuberculosis, or in physical therapy is given to public health nurses or nurses employed by other health agencies and by hospitals.

Short courses for nurses, consisting of 4 weeks or less of academic or clinical instruction, observation, and training, are also provided in several specialized subjects. Nurses may be sent for a 3 weeks' course in contact investigation in venereal disease. Two months' experience in public health is provided for student nurses from the schools of nursing whose graduates are then qualified as public health nurses for field service.

One program for nutritionists provides a 12-month apprenticeship under the guidance and supervision of a public health nutritionist.

There are three programs for public health educators. One provides supervised field experience for 1 year, and another provides for sending these trainees to schools of public health. Short courses in health education techniques are made available for health educators in the State. One training program for statisticians sends them to a school of public health for an academic year. Six programs are for groups of sanitation personnel. One program for public health engineers and sanitarians consists of short courses of 1 to 2 weeks' duration in such subjects as epidemiology, public health administration, and public health education.

A 1 to 2 weeks' course is conducted to qualify water and sewage treatment plant operators. A 2 weeks' course is offered at least once each year for dairy and milk inspectors. A 12 weeks' course for sanitary inspectors is given jointly by the State health department and the Public Health Service in a field training center at Yonkers. Other shorter courses for sanitary inspectors are also given at this school. Short courses lasting from 1 day to 1 week are given for employees and operators of camps, restaurants, swimming pools, and similar facilities. There is no provision at present for full-year academic training in the school of public health for public health engineers and sani-

tarians, but this is the next step planned for the development of the sanitation training program, which has been in operation for only 1 year.

Three training programs are for technicians. One consists of a year's training in photo-fluorography. Two others of short duration are for laboratory technicians.

This listing of public health training given shows the present scope of the program. It is not exactly the same as it was in 1951 nor as it will be in 1953, but it shows the variety of content included and method of providing training.

Administrative Organization

Training is a vital part of public health administration. As such, it must be carried out by many people in administrative positions, including those in the local health departments as well as those in the State health department. Various schools, of course, also have an important part in providing adequate training for public health workers.

The administrative organization of training within the State health department is the result of evolution over the 18 years it has performed this function. Naturally, the training for any specific group of personnel can be done best by those providing service in that category; therefore, as new training programs were added, units were established within the appropriate division, bureau, or office to conduct the training of the members of that unit. As the training function of the department began to assume major proportions, it became evident that an office to integrate and correlate the training activities was needed. In 1948, the office of professional training was established as a part of the executive division and was delegated this responsibility. There was continued recognition of the need for providing training within the service units, however, and one or more professional workers in many of these units are today devoting full or part time to the administration of the training programs outlined.

The immediate staff of the office of professional training consists only of the director of the office and necessary stenographic assistance. Three nurses give full time to a training unit in the bureau of public health nursing and one

sanitary engineer devotes full time to a training unit in the bureau of environmental sanitation. In addition, one person in the office of health education, one in the division of medical services, one in the bureau of nutrition, one in the office of vital statistics, one in the division of laboratories and research, and two in the division of tuberculosis control devote part time to training activities.

Unification of training functions, including the common utilization of training facilities, determination of uniform policies and procedures, and equitable distribution of funds, is accomplished by frequent conferences among the members of the department who have a primary responsibility for professional training activities and by a regularly scheduled monthly meeting of all these persons. Reports to the commissioner of health on training policies and procedures and the training budget are submitted through the office of professional training. These reports and the budget represent the combined thoughts, interests, and needs of all persons concerned with training.

Budget Provisions

Adequate budgetary provisions are essential for the conduct of public health training programs. This year, the State health department has a training budget of \$624,495. Of this amount, \$252,000 is a State appropriation and the remainder is allocated from Federal funds. Salaries of a few of the people devoting full time to training are included in this budget, and the remainder is for the payment of stipends, travel expenses, and tuition for trainees. Other items of training expense not included in the training budget are the salaries and expenses of the many persons doing training on a part-time basis, the production of materials, and incidental items of expense incurred in connection with training. These are absorbed in the regular budgets.

Stipends of trainees are determined according to a formula which is acceptable to both the health department and the budget director's office. This formula provides that persons in preservice field training be paid 75 percent of the beginning salary of the position for which

they are training, those in academic preservice training who have dependents, 65 percent of the beginning salary, and those who have no dependents, 50 percent; those in in-service academic training, 80 percent of their salary at the time they go on leave of absence if they have dependents and 60 percent of such salary if they do not have dependents.

Typical Training Program

A description of the health officer training program will show the general pattern of all programs.

Advisory Committee

Seven members compose the advisory committee for the health officer training program. The deputy commissioner, the assistant commissioner for local health services, and the director of the office of professional training serve ex officio. Other members are the dean of a medical school, a county health commissioner, the assistant State commissioner of education, and the executive director of a voluntary health agency. The latter was formerly director of a school of public health, and if this were not so there would be an additional member representing that field.

The committee has no executive function but advises on policy and procedural matters. It meets regularly to consider qualifications of applicants, length of training, content of training, educational methods employed, or specific problems arising from time to time. Although the committee has no authority of direction, the advice given is usually decisive in future action.

Trainee Qualifications

Trainees must be graduates of an approved medical school; must have interned 1 year in an approved hospital; must be United States citizens or give assurance that they will be citizens upon completion of their training; must be licensed to practice medicine in the State or have reasonable expectation of being licensed upon completion of training; and preferably should be not over 35. The citizenship and license requirements are necessary to qualify for permanent appointment. The age require-

ment is not absolute, but exception is made only under unusual circumstances. Experience has shown a more probable expectation of success both during and after training for those who enter the field of public health early in their professional careers.

Selection

Applicants with the qualifications outlined are interviewed by a committee composed of three members of the State health department. Agreement on the suitability of a candidate must be unanimous before he is accepted for training.

Content

The training consists of the two parts previously listed as separate training programs: a year's residency training, and an academic year at an approved school of public health. A part or all of the residency training must be completed prior to attending the school of public health if such attendance is on stipend from the State health department. Usually, the minimum period which must be completed is 6 months, a requirement serving a threefold purpose: It permits the physician to determine whether public health is the field he wishes to enter; it permits the State health department to evaluate the physician before committing itself to financing the academic training; and it gives the trainee a background for attending a school of public health.

Representatives of the schools have concurred that such training is necessary for physicians not otherwise possessing some public health experience if they are to receive the maximum benefit from their academic experience. During the first 6 months of the residency program, the physician follows closely a guide for residency training, which outlines the experiences in all phases of public health practice that he will likely encounter when he accepts a position as health officer. During the second 6 months, the resident serves as an assistant to a county or city health commissioner or district health officer, performing designated duties under close supervision.

The residents are brought into the central office in small groups for three 1-week periods

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Tennessee Accident Fatalities, 1946-50

By ANNA LOVE SULLIVAN, B.S.

ACCIDENTS caused the deaths of 9,095 residents of Tennessee during the 5 years 1946-50, or an average of 1,819 deaths per year. In this same period, accidents were the fourth principal cause of death in Tennessee for persons of all ages.

When considered by age groups, however, accidents were found to be the leading cause of death for persons 1-24 years, the second principal cause of death for persons in the age group 25-44, and the fifth principal cause for all persons 45 years of age and over. (See fig. 1.)

Motor vehicle accidents outnumbered all other types of accidents in Tennessee for the 5-year period under study. The number and percentage of deaths by type of accident are shown:

Deaths From Accidents by Type
(1946-50)

Type	Deaths	Percentage
Motor vehicle.....	3,437	37.8
Home.....	3,072	33.8
Other public.....	1,821	20.0
Occupational.....	565	6.2
Other.....	200	2.2
Total.....	9,095	100.0

For Tennessee residents in the 1-24 age bracket, accidents caused more deaths over the 5-year period than did the other five leading causes of death combined. In this age group, accidental deaths numbered 2,739, while the total number of deaths was 2,687 for the next

five leading causes of death—tuberculosis (second), influenza and pneumonia (third), malignant neoplasms (fourth), diseases of the heart (fifth), and homicides (sixth).

During 1946-50, 1,547 children under 15 died from all types of accidents, an average of 309 deaths for each of the 5 years.

The death rates according to type of accident resulting in death varied according to age. In young adults, the motor vehicle accident rate was very high, followed by a slightly lower rate for the age group 30-54 years. But these lower rates were followed by higher rates for persons 55 and over. For the age groups between 15-64 years, death rates from motor vehicle accidents were higher than were the rates for other types of accidents.

Home accidents caused many deaths in children below 10 years and resulted in a very high rate in old age. Occupational accidents caused approximately six deaths per 100,000 population per year for those 25 years of age and over.

Motor Vehicle Accidents

During 1946-50, on the average, 687 deaths per year from motor vehicle accidents were recorded. The trend of death rates since 1914 shows that deaths caused by motor vehicle accidents increased steadily until 1936, from the 1914 rate of 1.6 deaths per 100,000 population, to 27.9 in 1936. The high rate of 1936 was followed by lower rates, which are attributed to the restricted use of cars during World War II. Accident death rates since 1946 have again had a steady increase, reaching the rate of 25.9 in 1951.

Miss Sullivan is a statistician in the statistical service of the Tennessee Department of Public Health.

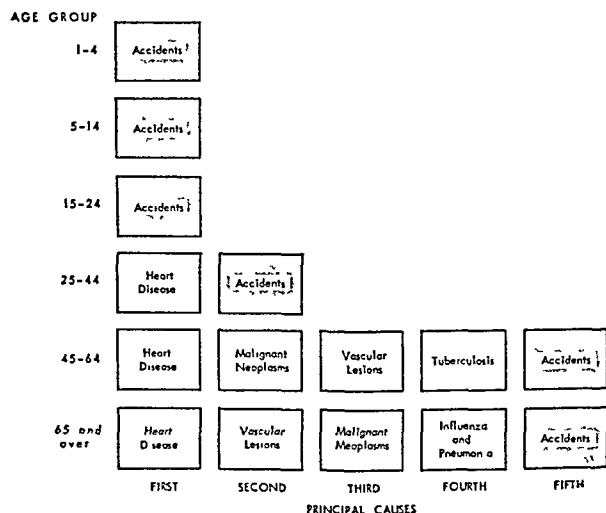
Collisions with other motor vehicles caused many accidents. Deaths from this type of accident numbered 965 or 28.1 percent of all motor vehicle accidents. Collisions with pedestrians caused 939 deaths (27.3 percent). Noncollision accidents killed 906 persons (26.4 percent), and other and unspecified motor vehicle accidents numbered 627 (18.2 percent).

The death rate for drivers was very high in the 10-34 age group, with the highest rate in the 15-24 group, indicating the need for accident prevention education in high schools. Accident death rates were very high for male drivers, higher than the rates for female drivers in all age groups.

The passenger death rate was also very high in the 15-24 age group. For pedestrians, the death rates were high in the older age groups with very high rates for males 65 and over.

The average annual death rates per 100,000 population by age and sex reveal a higher death rate for males in all age groups, with the highest rate (58.0) in the 15-24 age group. The next highest rate is that of males 65 and over. For females, the highest rate (14.3) occurs in the same age group, followed by the rate of 12.1 for the 55-64 group. Females 15-24 years of age had a rate of 11.6.

Figure 1. Relationship of accidents as principal cause of death to other causes, by age, Tennessee, 1946-50.



On the week end, the daily occurrence of accidents was higher than at any other time. The week-end increase started on Friday with 439 deaths (13.7 percent) occurring. The number

Useful Application of Data

That an aggressive program of accident prevention would help to save some lives is apparent from any study of routine accident data. Through dramatic use of accident statistics, the health department can inform members of its community about the needless tragedies caused by lack of caution in the home and on the highway.

Tennessee is doing just this. The accompanying paper is one illustration of how accident statistics can be usefully applied. Another illustration is the release in 1952 of a 20-page pamphlet "Stop Look Listen—Prevent Accidents" by the Tennessee Department of Public Health. The fatality statistics presented in this issue are a slight abridgment of the information contained in the pamphlet and reported in March 1952 to the Tennessee Public Health Association.

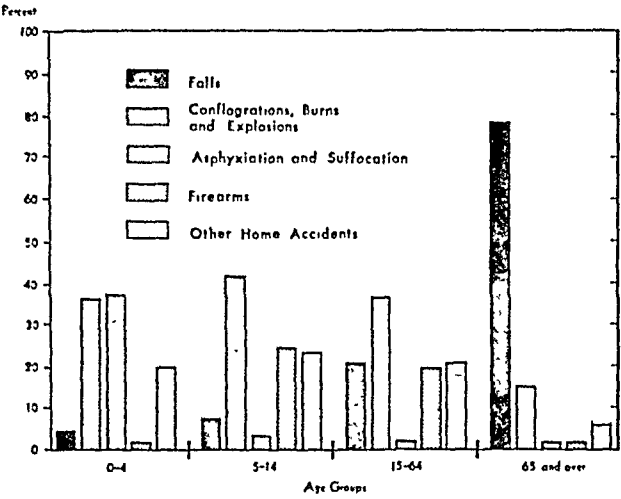
was greatest on Saturday (23.2 percent) and decreased to 18.0 percent on Sunday. Fewer accidents occurred on Tuesday, Wednesday, and Thursday, with a low of 10.4 percent on Thursday.

Average annual death rates per 100,000 population from motor vehicle accidents were also studied by counties for 1946-50. Very high rates were noted for 35 of the 95 counties in Tennessee. Davidson County, in which Nashville is located, had the highest rate (24.0) of four Tennessee counties (Davidson, Hamilton, Knox, and Shelby), containing the four largest cities. Shelby had the lowest rate, 15.9.

Home Accidents

Although persons of all ages are exposed to hazards in the home, the highest death rates from home accidents were found in the two age groups, under 5 years, and 65 and over. Falls were the most frequent cause of home accident deaths. Of the 1,332 deaths (43.4 percent) from falls, 1,124 (84.4 percent) of all falls occurred in the age group of 65 and over. Con-

Figure 2. Fatal home accidents by type and age group for 5 years, Tennessee, 1946-50.



flagrations, burns, and explosions came next with 818 deaths.

Accidental deaths from firearms were noted for all ages. Twelve deaths were those of children under 5; 53 deaths were in the age group of 5-14. For adults 15-64 years of age, 154 deaths were recorded.

Of the 818 deaths from conflagrations, burns, or explosions in the home, 439 were the result of fatal burns and explosions other than in a burning building. Many deaths (79) were caused by burns from open grates; half of these (39) were of persons in the age group 65 and over; and 14 were of children 0-4 years. Explosions caused 69 of the 439 deaths with the largest number occurring in the 25-44 age group. Scalds killed 53 with 19 deaths occurring in the age group 65 years and over. Burned fatally by stoves were 25 children under 5 years. The age group 65 and over had more deaths (140) of the total 439 than did any other age group. A total of 101 deaths, the next highest number, occurred to children 0-4 years.

For children under 15, over half of the 1,547

deaths from all types of accidents (866 or 56 percent) were from accidents in the home. There were 647 deaths of children under 5. Conflagrations and burns accounted for 233 deaths—asphyxiation and suffocation for 244.

Other Public Accidents

Many fatal accidents occur every year in public places. In Tennessee, there were 1,821 such deaths in the 5 years studied from other than motor vehicle accidents. They have been tabulated by transportation and nontransportation, and by type of accident.

Of the 608 deaths caused by transportation other than motor vehicles, 248 were from railroad accidents where no motor vehicles were involved, 181 were due to water transportation accidents, and 146 to air transportation.

Drownings occurred more frequently in June and July than in other months and caused 620 deaths in the 5-year period.

Occupational Accidents

Industrial or occupational accidents are defined as accidents arising out of or occurring in the course of gainful employment exclusive of injuries to domestic servants and to persons involved in public transportation accidents. Tennessee had 565 occupational accident deaths in the period studied.

Leading in occupational accidents were agricultural accidents. Of the total 565 fatalities, there were 152 accidental deaths in agriculture, an average of 30 per year. Ninety-seven deaths (a yearly average of 19) occurred in employment in transportation and public utilities; and 90 deaths (an average of 18 per year) in mining and quarrying industries. Manufacturing industries had the lowest number, 71—a yearly average of 14.



Reactivity of VDRL Antigen Suspensions Made at Various Temperatures

By PAUL FUGAZZOTTO, Ph.D.

WHENEVER a study is conducted to evaluate the performance of serologic tests for syphilis, the final analysis usually reveals a considerable "spread" in the levels of sensitivity and specificity attained by the participating laboratories, irrespective of the test procedure or the kind of antigen employed. As a matter of fact, wide differences in results are obtained even when all participants use the identical test material in the same test procedure. For example, in a recent National Serologic Laboratory Evaluation all interested participants were given the same VDRL test material to use in the studies. When the results were tabulated it was evident that the reactivity levels shown for the VDRL test varied to essentially the same degree as those shown for other test procedures in which few if any of the participants used the same test material. It appears, therefore, that the reproducibility of serologic test performance is dependent upon the standardization of other factors (besides the antigen) which have not been well enough defined in the literature, and which are therefore poorly or insufficiently controlled in practice. Experience has shown that environmental temperature ("room temperature" so called) is one such factor.

The present work was undertaken to obtain data on the effect of variations in environmental

temperature on the physical appearance and reactive nature of a flocculation test antigen suspension.

Method

The VDRL test was used for this study. In order to avoid features involving differences of opinion, it seemed well to keep the study as objective and tangible as possible. To avoid further complications in interpretation of results, the study was limited to temperature variations introduced only at the point in the procedure where the saline-antigen suspensions are prepared. To simulate conditions comparable to variations in room temperature, all the materials required for preparation of the suspensions (except the antigen) were placed in the refrigerator or in the incubator for periods of time sufficient to impart different temperature levels to them. (The bottle of VDRL antigen was left in the environment of the laboratory: 22.4° C.) Using these various materials and following the stipulations set forth in the serologic test manual (1), 10 saline-antigen mixtures were made. Immediately after each suspension was made, a thermometer was placed in the solution to determine the temperature of the resulting antigen suspension. These values were recorded, and for sake of convenience were designated as "suspension temperatures." Then the suspensions were allowed to establish equilibrium with the temperature of the laboratory (22.4° C.) before they were used in the comparative tests. From this point on, meticulous care was taken to as-

Dr. Fugazzotto is the chief serologist in the bureau of laboratories, Indiana State Board of Health, Indianapolis.

Table 1. Comparative sensitivity of VDRL antigen suspensions prepared at various "room temperatures"

[Tests with pooled reactive serum in series dilution]

Antigen No.	1	2	3	4	5	6	7	8	9	10
Suspension temperature, ° C.	15.3	18.2	19.4	21.2	21.8	22.7	23.6	24.8	29.6	37.0
Serum dilution	Plus readings									
1:4	2	3	3'	4	3'	3	3	3	2'	1'
1:8	1	1'	2	2	2	2	1'	1'	1	±
1:16	±	1	1	1	1	1	1	±	±	—
1:32	—	±	±	±	—	—	—	—	—	—
1:64	—	—	—	—	—	—	—	—	—	—
Total pluses	3.5	6.0	7.0	7.5	6.5	6.0	5.5	5.0	4.0	2.0

Note: The mark (') denotes a reaction slightly stronger than the plus reading shown.

sure identical treatment of the reagents. The serologic test results were read by a well-trained technician who had no previous knowledge regarding the nature and purpose of this study. The recordings were made in terms of pluses for convenience of comparison.

Results

The suspension temperatures, as observed and recorded immediately after preparation of the suspensions, ranged from 15.3° to 37° C. (table 1).

The first step in studying these preparations consisted in an examination of the suspensions themselves. To several chambers of a Kline test slide there was delivered 0.05 ml. of VDRL buffered saline. One drop of each antigen suspension was dispensed into a separate chamber of this slide, the slide was tapped gently to disperse the particles, and the material was examined under the microscope. The slide was then placed on a conventional agitating machine at 180 rotations per minute for 4 minutes, and the material examined again.

In this series of suspensions there was a wide range in particle size: very fine pinpoint at the low temperature extreme to very large needle-like particles at the high temperature extreme. With the exception of suspension No. 10 (in which the very large particles had a tendency to become entangled on agitation) there was no appreciable change in the appearance of the

material on the slide after the 4-minute agitation.

The next step in the study of these suspensions was to test their sensitivity to reactive serum. For this purpose, a mixture of reactive serums was prepared; a series of saline dilutions was made by the double dilution method, and these dilutions were tested simultaneously in the usual manner with all 10 antigens. In table 1 are given the results obtained with each antigen on each dilution of serum.

Glancing over these results, we can see a definite reactivity curve having a peak in sensitivity at the level of antigen No. 3 or 4. The totals of the pluses shown at the bottom of the table are not necessarily significant in themselves, but are given as a means of expressing the sensitivity curve. As indicated here, the sensitivity was greatest for the antigen prepared to have a temperature of 21.2° C.

Finally, comparative tests were done on a group of 36 routine clinical specimens. These specimens were selected because they were weakly reactive in the Mazzini test. For this work, only 5 of the 10 suspensions were used.

On analyzing the results obtained with this group of 36 specimens it was found that the data could be divided into two subgroups because of the two reaction curves represented (see chart): subgroup A, in which the paraboloid type of reaction was displayed, and subgroup B, in which the reaction seemed to be the semiparaboloid type. In order to show the uniform pat-

tern of reactivity displayed by this series of antigen suspensions when used on individual test serums, the entire protocol, separated accordingly, is given in table 2. The totals and averages of the pluses are also given as an expression of the over-all picture.

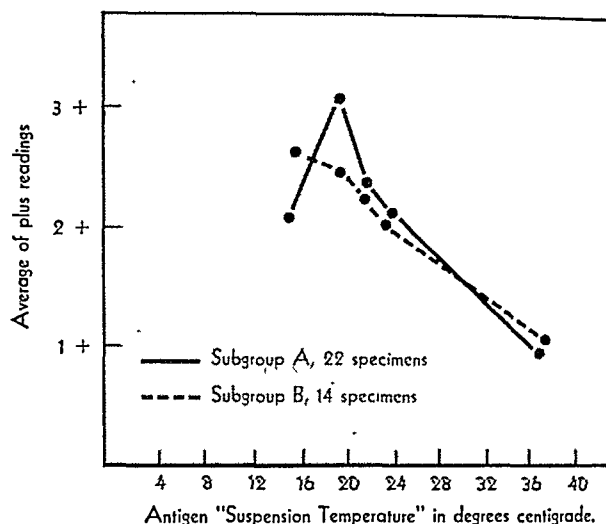
The reaction curves are better illustrated by the chart, in which the average plus readings (shown for both subgroups in table 2) are plotted against the respective "suspension temperatures."

The fact that the curves in the chart show a difference in elevation can only be considered a coincidence. On the other hand, the difference in the scope of the curves seems to be due to the nature of the serums under test. Irrespective of the type of reactive specimens involved, however, there was an obvious decrease in sensitivity of the suspensions as the "suspension temperatures" became elevated (above 22° or 23° C.). In addition to this, the suspensions prepared at the higher temperatures were rather coarse and more difficult to evaluate. Suspensions such as No. 10 would definitely be considered unsatisfactory, even by the inexperienced technician.

Discussion

In considering the effect of temperature on serologic tests we must not fail to recall the work of Kahn, who has long shown with one form of "verification test" that, irrespective of its diagnostic value, differences in reactions are very often obtained under different environmental temperatures. All syphilis test antigens in present use are derived from essentially the same material and, whether we realize it or not, as long as one serologic test procedure is affected by environmental temperature, any procedure we may choose to employ is bound to be similarly affected. The only difference between the above-mentioned verification test and routine serology is that in the former each serum is tested in triplicate and the effects of various temperatures on the colloidal-chemical reaction can be seen side by side. In routine serology a given procedure is applied under only one undetermined and uncontrolled set of environmental temperatures and conditions. No comparative effects are seen; and there is no assur-

Variation in the sensitivity of VDRL antigen suspensions and temperature at which the saline-antigen mixtures were made.



ance that the test results would be duplicated on another day, or in another laboratory.

The philosophy advanced here is that "room temperature" is not a standard, designated by any particular line on a thermometer. The term itself serves only as a means of making the distinction between the main bulk of the laboratory space and the controlled thermal equipment, such as the refrigerator, incubator, and autoclave. It designates a place more than it does a condition. The thermometer reading in that place can vary over wide limits, and the fact that we ignore this in our routine work does not prevent it from exerting its influence on the test. Normal room temperature may range anywhere from near 0° C. to above 37° C. depending on the season of the year, geographic location of the laboratory, position of the room in relation to the rest of the building and the points of the compass, presence or absence of large electrical and steam equipment, air conditioning, windows, and many other features. Furthermore, it may vary on any one day from place to place in the room and from time to time. Reagents kept in such a laboratory must be expected to have the temperature of their immediate environment: cooler near the floor, warmer higher up. In winter they will be cooler in a cabinet on an outside wall, warmer in a cabinet on an inside wall—vice versa perhaps in the summer.

A good example of the type of situation that

Table 2. Comparative sensitivity of VDRL antigen suspensions prepared at various "room temperatures"

[Tests with selected clinical specimens]

Subgroup A						Subgroup B					
Antigen No.-----	1	3	5	7	10	Antigen No.-----	1	3	5	7	10
Suspension temperature °C.---	15.3	19.4	21.8	23.6	37.0	Suspension temperature °C.-----	15.3	19.4	21.8	23.6	37.0
Serum No.	Plus readings					Serum No.	Plus readings				
1-----	3	4	4	3	2'	3-----	3	3	2'	2	1
2-----	2'	3	3	1	1	6-----	2	2	1'	1	±
4-----	2'	3	2'	2	2	7-----	2'	2'	2	2	±
5-----	±	1	±	—	—	8-----	2'	2	2'	2	1
9-----	1	2	2	1	±	10-----	1	1	1	1	—
12-----	1'	2	1	1	—	11-----	2'	2'	1'	2	1
13-----	2	3'	2'	2	1'	16-----	2'	2'	2	2	1
14-----	3	3'	2'	NT	NT	17-----	2'	2	2	2	1'
15-----	2'	3	2'	2	1	18-----	3	2'	3	2	1
19-----	1'	2	1'	1	±	20-----	4	3	3	2'	1
21-----	2	3	3	2'	1	26-----	2	NT	1'	1'	±
22-----	2'	3	3'	3	1'	27-----	2	2	2	1'	±
23-----	1'	2'	1'	1'	±	29-----	4	4	4	4	2'
24-----	1'	2	2	1'	±	32-----	3	3	2'	3	2
25-----	2'	3	2'	2	1						
28-----	2	2'	2	1'	±						
30-----	2'	3	2'	2	1'						
31-----	3'	4	3'	3'	2						
33-----	1	1'	2	1	±						
34-----	2	2'	2'	1'	±						
35-----	3	4	3	2'	1						
36-----	2	3'	2'	2'	1						
Total pluses-----	46.0	61.5	52.3	39.0	20.5	Total pluses	36.5	32.0	31.0	28.5	14.5
Average-----	2.09	3.07	2.38	2.04	0.97	Average-----	2.61	2.46	2.22	2.02	1.03

NOTE: The mark (') denotes a reaction slightly stronger than the plus reading shown. NT=Not tested.

actually obtains in laboratories is illustrated by an experience in a rather large, air-conditioned private laboratory which had a room temperature of 23° C. (75° F.) on a day when the out-of-doors temperature was -10° C. (14° F). The temperature in the cabinet hanging against an outside wall and containing the glassware, saline, and antigen was 8° C. (46° F). While the materials were used in the room at 23° C., the temperature of the reagents did not at all approach that of the room when the antigen suspension was made, not to mention the fact that the antigen itself had in reality been refrigerated for at least one period of approximately 12 hours prior to its use. Yet the technician considered his work satisfactory; he had complied with the instructions in the literature and had been using the material at room temperature.

The data given in this report are not presented to specify the suspension temperature at which the VDRL test antigen suspension should be made; for in the first place, the optimum suspension temperature might well differ for each alcohol preparation of the material (a phase which has not yet been studied); and second, the incorporation of such a stipulation in the test procedure is a matter for the consideration of the test authors. This report is intended only to record the observation that differences in the appearance of the microscope field as well as differences in sensitivity could be demonstrated to result from controlled variations in room temperature even though the variations were affected for only one of the many phases in test procedures where temperature can and does vary in actual practice.

The resulting differences in sensitivity of the antigens studied may not appear especially startling; and perhaps for practical purposes such variations can be considered negligible. However, if we carefully study serologic test procedures from the standpoint of the numerous combinations of conditions under which differences in temperature and other factors can easily be introduced, without violating the instructions given in manuals of procedures, we can readily understand that to a great extent inconsistencies in results are without doubt due to the "negligible" effect of one variable superimposed upon that of others.

The effects of all the negligible features are just as important to that serologic summation which we call the serologic test report, as seconds are to the accumulation of time.

Conclusions

Since temperature influences the colloidal make-up and behavior of syphilis test antigen suspensions, and since the temperature can be controlled for certain phases of serologic test procedures, the optimum temperature range for these phases should be determined and speci-

fied in the literature. The term "room temperature" has little or no meaning from a scientific standpoint, and should be deleted from serologic test descriptions.

Summary

In a laboratory with a "room temperature" of 22.4° C. it was possible, under controlled conditions, to prepare antigen suspensions under conditions of temperature ranging from 15.3° C. to 37° C. With the use of these antigens (brought to a room temperature of 22.4° C.) data were obtained showing that the microscopic appearance and the sensitivity of a flocculation test antigen suspension (VDRL) are in a degree determined by its temperature at the time it was made.

This report is offered as an indication that environmental temperature is one of the factors contributing to wide variations in serologic test performance.

REFERENCE

- (1) U. S. Public Health Service: Manual of serologic tests for syphilis. Supplement No. 22, J. Ven. Dis. Inform., 1949.

Dr. Foard Retires

Dr. Fred T. Foard, chief of the branch of health, Bureau of Indian Affairs of the Department of the Interior, retired as an officer of the Public Health Service on October 31, 1952, after 36 years of service. He is now director of the division of epidemiology for the North Carolina State Department of Health.

Dr. Foard began his public health career by assisting in control of malaria, typhoid, and other environmental diseases in the West and Southwest. In 1920 in Montana he organized the first full-time county health unit in the Rocky Mountain tier of States, and assisted health officers in 10 other western States to organize district and local units when funds became available under the Social Security Act.

Recent Progress in Cancer Research

By JOHN R. HELLER, JR., M.D.

THE MANY recent advances in cancer research make possible the cure of more cancers today than 20 years ago. Unless the cancer is far advanced, modern surgery or radiation, or a combination of the two, now offers the patient a greater opportunity for survival. There is also a better outlook for patients with advanced cancer who may be beyond the hope of permanent cure. New palliative measures have been developed which may prolong lives in comfort and increase their usefulness. All of this is possible even though knowledge of the etiology of cancer is slight, and an all-purpose cure for cancer's many forms is lacking.

The fact that one can regard cancer in such an encouraging light is highly significant, for the concerted attack against it is relatively new. Modern cancer research goes back about 50 years, but only since the end of World War II have significant sums of money been available for this purpose. Support and coordination of research are now being provided on an unprecedented scale, and many of the ablest investigators in the Nation are teamed in an effort to conquer cancer.

Nonetheless, cancer poses a dilemma which few other diseases can match. It is a complex public health problem because in cancer we are dealing not with a single disease, but with many

diseases. The more data that are accumulated in the research laboratories, the more there appears to be learned about the cancerous process, its growth, and its control. The multitude of new approaches that have come to light seem to branch out into an almost infinite number of ideas. There appears to be an endless amount of knowledge which can be accumulated about cancer.

The vastness and diversity of cancer research can be illustrated by reviewing some of the many approaches employed by cancer investigators.

Basic Research

A large part of cancer research is devoted to basic studies which increase understanding of the carcinogenic process and tumor development. Advances in basic research come slowly and seldom make headlines, but they are vital to the search for better methods in diagnosis, control, and therapy. The advances noted here by no means cover the entire field of basic research, but rather illustrate the kind of original work being done in laboratories of this country.

Among the advances in the basic biological sciences are those which have emerged from tissue culture laboratories. An important contribution which will make possible more effective use of tissue culture in the study of both normal and cancer cells is the three-dimensional tissue culture technique developed by Earle and his associates at the Public Health Service's National Cancer Institute (1). These scientists have grown massive cultures of tissue cells in the interstices of three-dimensional masses made up of thousands of glass rings. Many

Dr. Heller since 1948 has been director of the National Cancer Institute in the National Institutes of Health of the Public Health Service. He presented the material upon which this paper is based as the William Chester Warren Memorial Lecture at the Emory University Postgraduate Clinic, June 6, 1952.

applications for this technique are foreseeable. Already it has been applied in collaborative studies with the Naval Medical Research Institute to obtain large cultures of human epithelial cells for skin grafting purposes.

A new technique for growing cancer cells outside the body in the form of recognizable tissues has been developed by Leighton of the National Cancer Institute (2). His sponge matrix method for tissue culture employs an ordinary cellulose sponge as the skeleton on which the cancer cells are grown. Cells grown in this way form organized aggregates which frequently resemble the tissue pattern present in the living animal. This method has been used to grow many animal tumors and at least two human tumors, a malignant melanoma and a chondrosarcoma. The melanoma grew very well and produced new pigment within the sponge. The sponge-grown tissue can be sectioned, stained, and studied with the same methods used in examining tissues from the body. This technique for tissue culture might be used to study the direct effects of drugs, hormones, or radiations on neoplastic tissues or to study the factors, and perhaps the patterns, involved in tumor growth and metastases.

A valuable tool for the study of carcinogenesis, tumor development, and related problems has been developed at Yale University by Greene, who has transplanted human tumors to the brains of mice and guinea pigs (3). With the exception of brain neoplasms, however, only tumors which had metastasized were transplantable. Human tumors were grown in mice for 70 to 90 days before the mice died. In guinea pigs the tumors grew for as long as 90 to 100 days.

A new medium for the growth of malignant tumor tissue which conceivably may be applied to problems of human cancer has been discovered by Lutz at Boston University (4). He has used the cheek pouch of the hamster as a site for the growth of neoplastic tissue, both homologous and heterologous, under conditions in which frequent observation and exact measurements can be carried on for long periods. Human tumors and tumors from the rat, mouse, guinea pig, and frog have been grown by this means.

Among the recent basic studies relating cancer to prolonged hormonal imbalance are those

of Morris and his associates at the National Cancer Institute. These investigators have recently developed transplantable cancers of the thyroid gland of mice following the ingestion of thiouracil, a goiter-producing drug which inhibits the secretion of thyroxin (5). These cancers, when growing in normal animals, provide valuable material for experimental research dealing with problems of thyroid cancer and hormonal imbalances, and aid in the search for improved methods of using radioactive iodine in the treatment of thyroid cancer in man.

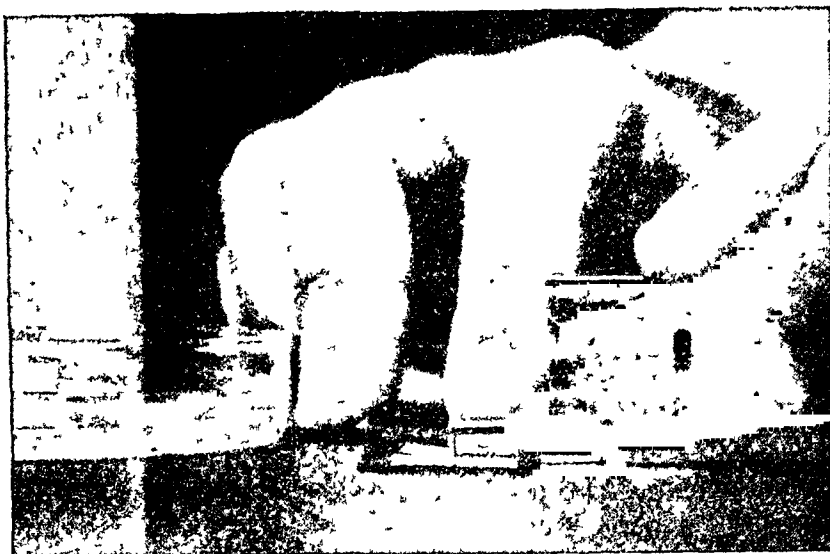
Tools for the development of cancer therapeutic measures have been provided by the chemical-screening projects conducted at the Memorial Hospital for Cancer and Allied Diseases, the National Cancer Institute, and other laboratories. Shear and his associates at the National Cancer Institute have tested more than 3,000 chemicals for tumor-damaging ability (6). About 500 have been found to damage sarcoma, 37 in mice following a single injection of a near-lethal dose. It must be emphasized that these compounds are not yet clinically useful, but they provide a stockpile from which it may be possible to develop drugs to treat cancers of man. It is essential that chemicals with some potential ability to affect the growth of cancer be tested thoroughly on experimental animals before they are made available for clinical trial. Screening itself is only the beginning of a chemotherapy program; it must be followed by systematic and extensive pharmacological research.

Clinical Research

In addition to advances in basic research, cancer investigators have reported encouraging progress in the search for improved methods in treatment and diagnosis.

The treatment of cancer, once limited to the use of surgery and radiation, has been expanded to include anticancer drugs, hormones, and radioactive isotopes (7). Although the cure of cancer still remains with surgery and radiation, these new agents are valuable additions to the therapeutic program. Perhaps progress should not be measured entirely by cure, as Steiner of the University of Chicago has pointed out, for this criterion fails to give credit to palliation

The first step in the sponge matrix method for tissue culture, developed at the National Cancer Institute. With an ordinary razor blade, thin slices are cut from narrow strips of sponge; then the slices are washed, sterilized, and placed in test tubes to receive implantations of tissue.



(8). In his words, "Enormous and gratifying progress has been made in prolonging life in usefulness and comfort by chemotherapeutic, endocrinological, surgical, and radiological palliative measures," and "research that results in better palliation is significant because of the possibility that by becoming very slightly more effective it will be curative."

Surgery

In the field of surgery there has been a remarkable series of refinements and improvements. Radical surgery has emerged as an important development. Knowledge of the physiological limits of surgery has become more exact. As a result, a great variety of cases that were hitherto considered inoperable and hopeless may now undergo surgery with good chances of survival.

One example of the concept of more radical surgery is seen in a review of the old and the new techniques employed in breast cancer. Previously, the mastectomy removed little more than the breast and the armpit lymph nodes. The surgical concept was enlarged because in numerous instances it was seen that the cancerous lesion spread after surgery. Following extensive research, which revealed that the lymph nodes under the ribs frequently harbor cancer cells, breast surgery began to involve the removal of more bony structure and the lymph nodes under the ribs in properly selected cases.

Many factors other than better operative techniques are also contributing to the continuing

improvements in cancer surgery. Among these are better preoperative and postoperative care, better anesthesia, control of infection by antibiotics and chemotherapy, and control of shock by transfusions.

Radiation

In recent years the comparative advantages of surgery and radiation have been under intensive study, and the question of when to operate and when to irradiate is now better understood. At the same time, numerous technical advances have been made in radiation therapy. In addition to radium, radon, and medium voltage X-ray machines, the radiologist has at his disposal supervoltage X-ray generators, new types of radiation from the betatron and the cyclotron, and a number of new radioactive substances for use in treatment.

Among other advances in the field of radiation, progress has been made in controlling or avoiding radiation burns and radiation sickness. Investigating the problem of radiation sickness, scientists at a number of laboratories are seeking ways to modify lethal irradiation injuries. In collaborative studies with the Argonne National Laboratory of the University of Chicago, Lorenz and his associates at the National Cancer Institute have discovered that intravenous or intraperitoneal injections of bone marrow into mice and guinea pigs enable from 70 to 100 percent of the animals to survive acute lethal doses of irradiation (9). These discoveries may prove valuable in the irradiation

The large tumor on the mouse's flank is a transplant from one of a number of thyroid cancers produced experimentally in mice. The transplantable thyroid cancers provide a valuable new tool for cancer research.



tion treatment of cancer and in improving survival chances following lethal amounts of irradiation, as in atomic warfare.

In the treatment of cancer, the byproducts of atomic research called radioisotopes continue to exhibit increasing utility. Radioactive iodine has been used with good results in some cases of inoperable cancer of the thyroid. Phosphorus and sodium are used in whole body radiation; gallium, in bone tumors. Radioactive phosphorus is used in the treatment of polycythemia vera and certain chronic leukemias; gold is used in cancer and peritoneal and pleural carcinomatosis, and bromine in bladder tumors.

The use of most of these radioactive isotopes requires further experimentation. Better means must be found for localizing many of the isotopes within the cancerous areas, and more effort must be expended in developing radioactive compounds with a high degree of tumor specificity.

Radioactive cobalt appears to show some promise as a substitute for radium. More abundant than radium, radioactive cobalt is relatively inexpensive and will be available through the Atomic Energy Commission to both general practitioners and specialists who

meet AEC standards. Cobalt can be handled more easily than radium and can be fashioned into various pliable shapes, thereby permitting the radiologist greater flexibility in applying dosages.

It must be emphasized that radium therapy is not going out of use. Radium still plays a tremendously important role in cancer therapy throughout the world. Through the radium loan program of the National Cancer Institute alone, 56 hospitals (in 29 States and the District of Columbia) are employing this type of therapy. Early in 1952, Roosevelt Hospital in New York City unveiled a new converging beam projector radium therapy unit. The projector, weighing 5 tons and using 50 grams of radium, has the power of a 20-million-volt X-ray machine. Radium therapy units such as this and the high voltage X-ray machines now in use offer hope for the cancer patient. With these, it is possible to reach cancers which are not amenable to other radiation therapy or for which surgery offers a low cure rate. Such units are designed to increase the effect of radiation therapy on deep-seated tumors.

Anticancer Drugs

Although their present clinical importance should not be overemphasized, one of the most encouraging aspects of cancer therapy is the rapid development of new chemical agents. None has achieved the status of a cancer cure. But it can now be said, in contrast to the dismal outlook of 15 or 20 years ago, that chemotherapy has been established as a valuable and sound adjunct to surgery and radiation.

Some anticancer drugs have had wide clinical trial. Nitrogen mustards given intravenously have produced temporary remissions in patients with Hodgkin's disease, lymphosarcoma, chronic leukemias, and mycosis fungoids. Triethylene melamine, a newer agent, has produced similar effects in Hodgkin's disease, lymphosarcoma, chronic leukemias, and neuroblastoma when administered by mouth. A drug formerly used as an anesthetic for laboratory animals, urethane (ethyl carbamate) has been found useful in the treatment of some chronic leukemias and multiple myelomas. In the treatment of acute leukemia in children, the

folic acid antagonists, notably aminopterin and amethopterin, have caused temporary clinical improvements. Among other drugs showing promise in the treatment of leukemia, there is a new compound, GT-41 or 1,4-dimethyl sulfonyl butane. Temporary remissions in chronic myelogenous leukemia have been obtained through the use of GT-41, Dr. Alexander Haddow of the Chester Beatty Research Institute, London, reported at the Second National Cancer Conference in Cincinnati during March 1952.

A technique for intra-arterial chemotherapy which may become a valuable auxiliary to surgery and radiation in treating cancer has been developed by Bierman at the National Cancer Institute's Laboratory of Experimental Oncology, San Francisco, and by Klopp at George Washington University, Washington, D. C. This technique uses specially designed catheters to inject drugs into close contact with the cancers, lessening damage to normal tissues (10). Administration of agents by the intra-arterial route appears to be quicker and to produce results of longer duration than intravenous injections. Recently there have been successful attempts to employ chemotherapeutic measures to prepare apparently inoperable cancer patients for surgery. Klopp and his collaborators have reported that aureomycin given intra-arterially or intravenously permitted surgery on several cancer patients whose lesions could ordinarily be considered inoperable.

Hormones

Huggins of the University of Chicago was among the first to demonstrate that induced imbalances of hormones might have marked effects on some types of neoplastic disease. He observed remissions in the growth of prostatic cancer following castration and administration of estrogenic substances. Correlative work on carcinoma of the breast by many investigators in the United States and in foreign countries has indicated that the general principles developed by Huggins may obtain in certain cases of mammary cancer. Unfortunately, the beneficial effects of hormones seem to be temporary to the majority of subjects, but there is hope that present studies will lay the groundwork for hormonal cure of certain specific cancers.

Measuring the toxicity of tumor-damaging drugs by injecting them into eggs and observing the effect on chick embryos, one of the early steps in the development of possible anticancer drugs.



Hertz and Cromer have used hormones to prepare patients for surgery (11). Observing the effect of progesterone on carcinoma of the cervix, they found that regressive alterations of the tumor occurred in 11 of 17 cases and that only one patient showed actual tumor progression while under progesterone therapy. More recently, Hertz has been giving intensive doses of a water-soluble form of estrogen to persons with breast and prostatic cancer. Administered intravenously and subcutaneously, these large doses are well tolerated by the body and are reported to be highly effective in activating estrogen therapy. This new technique is under study to see whether it may be more useful than other types of estrogen therapy.

Research on Diagnosis

Because the curability of cancer is closely related to early diagnosis, the problem of finding a good screening test is an urgent one. An ideal solution would be the development of a blood test like the Wassermann—a test which can be applied on a mass basis at reasonable cost and which is specific enough to identify a high percentage of cancer cases at an early stage. At present there is no such general cancer test. Many new tests have been developed and evaluated, but as yet none has been found which is sufficiently sensitive and specific to be practicable.

However, the approach seems hopeful. It is known, for instance, that there are changes in the body chemistry of cancer patients. For example, in some patients with prostatic cancer the acid phosphatase level is increased. Much effort is being expended in this area of research. Among the approaches are physical and chemical analyses of the body fluids, development of certain immunological reactions and many enzymological procedures, and the use of radioactive tracers.

Although a useful general test appears to be still in the future, some of the specific tests show definite promise. One of the most useful is the cytologic examination developed by Papanicolaou of Cornell University Medical College. Briefly, this test consists of collecting exfoliated cells—by aspiration or scraping—from a hollow part of the body; then placing the cells on a glass slide and examining them for possible cancer. The method is particularly useful as an aid to the diagnosis of cancer of the uterine cervix. In the past few years many qualified persons have been trained in the techniques of this test and the interpretation of its results, and at the present time some practitioners are routinely employing this screening procedure in cervical cancer diagnoses.

Although this test is theoretically applicable to any of the body excretions, further experimentation is necessary to determine its general use. From the standpoint of accuracy, the method is applied at present with greatest success in the diagnosis of cancer of the uterine cervix and the lung.

Cancer of the uterine cervix is of great clinical importance. The uterus is the second most frequent site of cancer in the female, and in that organ the disease occurs most frequently in the cervix. Cancer of the uterine cervix is reported to be 75 percent curable in the early stage and 15 percent when moderately well advanced. To determine the case-finding possibilities of the cytologic method in cancer of the uterine cervix, a 3-year study is under way in Memphis and Shelby County, Tenn., in which all women 20 years of age and older will be given an opportunity to have cytologic examinations for uterine cancer at yearly intervals. Supported by grants-in-aid from the National Cancer Institute, this project is being conducted with the

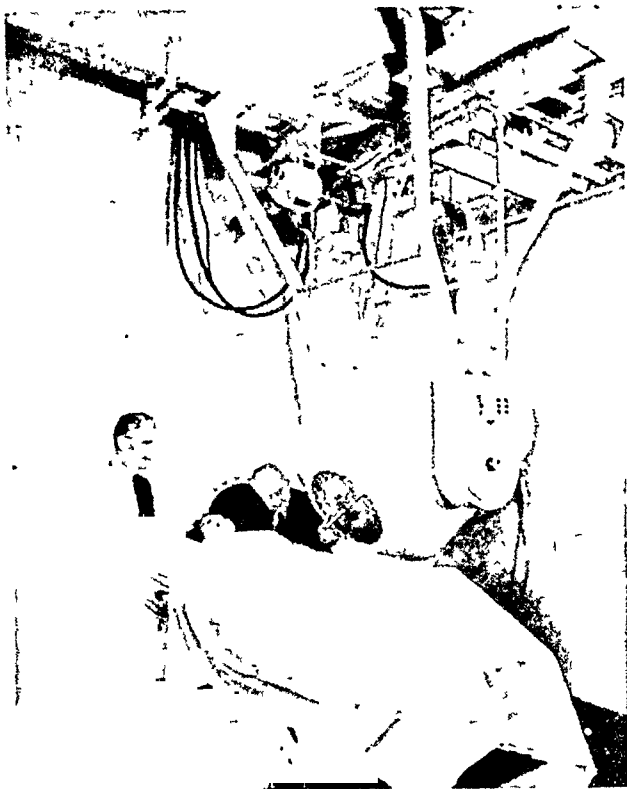
cooperation of the Memphis and Shelby County Medical Society, the Memphis and Shelby County Health Department, the Department of Obstetrics and Gynecology and the Institute of Pathology of the University of Tennessee College of Medicine, and the Memphis Division of the American Cancer Society. (See *Public Health Reports*, June 1952, frontispiece.) Further studies in this field will be done in the cytology laboratory which the National Cancer Institute will operate in the Public Health Service's new Clinical Center at the National Institutes of Health, Bethesda, Md.

Variations of the original cytologic technique have been developed for the diagnosis of cancer of other sites. An abrasive balloon technique has been used with some success in the detection of gastric carcinoma. In this technique the balloon, covered by a fine, silk mesh, is inserted in the stomach, inflated, deflated, and withdrawn. The stomach debris which clings to the mesh of the balloon is examined with a microscope for cancer cells. Although this new diagnostic tool shows considerable promise when used in conjunction with X-ray, it requires further evaluation.

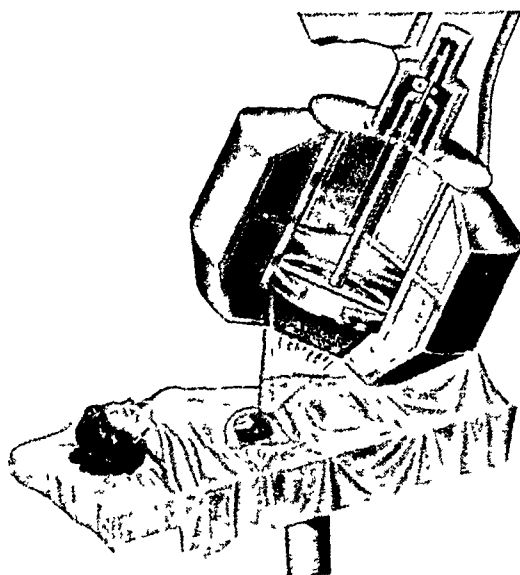
Gastric cancer is the first-ranking cause of cancer deaths among men. The development of a good diagnostic procedure for this type of cancer is essential since conventional methods discover only about one-fifth of the cases at an early stage. Toward this end, Traut and Rosenthal of the University of California have developed another new technique. It consists of washing the patient's stomach with a solution of papain, an enzyme which dissolves the mucus on the stomach lining and thereby frees cancer cells trapped by the mucus.

In the X-ray field at least two tools have been developed which aid the early detection of gastric cancer. Morgan at Johns Hopkins University has adapted the Schmidt camera to photo-fluorography for mass screening to discover gastric cancer. Moon at the University of Chicago has developed a device which combines X-ray and television equipment to give sharp, clear pictures of the dense parts of a patient's body.

Atomic energy research has provided still another approach to cancer diagnosis, that is, the use of radioisotopes as tracers to localize tumorous tissues. The use of isotopes in can-



The new converging beam projector radium therapy unit at the Roosevelt Hospital in New York City.



cer diagnosis rests upon the fact that certain abnormal body tissues concentrate large amounts of specific compounds above that of normal tissues. When these compounds are tagged with radioisotopes, the tissues which require the greatest amount of the compounds can be located with the aid of a Geiger or scintillation counter. Several isotopes appear to be of value in diagnosing cancers of various sites. Of the radioactive isotopes which have been used in their elementary form as diagnostic tracers, the best known is radioactive iodine for the diagnosis of metastatic cancers of the thyroid. Diiodofluorescein dye tagged with iodine has been used successfully in the localization of brain tumors, as has human serum albumin tagged with iodine. Phosphorus has been used with limited success in the diagnosis of cancers of the brain, breast, and testicle.

Cancer Morbidity Studies

The search for a diagnostic test has received much assistance from the rapidly developing field of cancer epidemiology. A number of studies and surveys relating to cancer morbidity

and mortality have been conducted which may provide the answers to such questions as: How many people have cancer? How many can expect to get cancer? What sites in the body are most frequently attacked by cancer? How are age, sex, and race associated with specific cancer sites?

Dorn and his associates at the National Cancer Institute have prepared a series of cancer morbidity studies based on data for 1947-48 and covering 10 major metropolitan areas: Atlanta, New Orleans, Birmingham, Dallas, San Francisco, Denver, Detroit, Chicago, Pittsburgh, and Philadelphia. These studies are particularly valuable since they present comparative data over a 10-year period, each of the areas having been surveyed in 1937-39. Following publication of reports on the individual areas, a United States summary will be prepared. This summary will contain geographic comparisons, interpretations of apparent national trends, and special analyses which are not feasible for individual areas. In general, the studies re-emphasize the importance of the varied programs directed toward achieving early diagnosis and treatment.

Cancer progress has many aspects. One is the drastic and wholesome change in public attitudes. Another important change is that cancer research is at last being supported on a scale that permits concerted, continuous effort. Since the close of World War II, unprecedented support and coordination of cancer research have been provided, research facilities have been increased substantially, and the number of research investigators augmented greatly. Investigation at the basic level is being pursued to an extent unknown just a few short years ago, yielding a gratifying number of advances in fundamental knowledge. The armamentarium of the research investigators has been strengthened by the addition of tools such as the cyclotron, the mass spectrograph, the electron microscope, and the ultracentrifuge. With improvements in cancer diagnostic techniques have come increases in cancer clinics and other facilities for diagnosis and treatment. Cancer surgery has been refined and improved, technical advances in radiation therapy have been achieved, and chemotherapy has been established as a sound adjunct to both. Research has added much information on carcinogens and carcinogenesis which may be useful in the prevention of cancer.

It is doubtful that anyone would venture to say how close we may be to solving the cancer problem. It is a complex and serious one and we must prepare for a long and costly effort. Although false hope must not be placed on preliminary reports and unsubstantiated claims, recent progress indicates that cancer can be re-

garded as a practical, scientific problem which science can solve—and will solve.

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Mechanical Air Drying Of Hands Following Preoperative Scrubbing

By PAUL E. WALKER, M.D.

THERE ARE several possibilities of bacterial contamination inherent in the drying of the hands and forearms following preoperative scrubbing. Contamination by dust-carried airborne bacteria is one of these. The degree of such contamination will vary with the amount of circulating dust, duration of exposure, and moisture content of the air. Since most operating room layouts are similar, these factors will probably be fairly constant among different hospitals. Scrubbing techniques differ somewhat, but the differences are not great enough to allow much variation in the elimination of bacteria. It is in the drying of the hands that the greatest possible opportunities for contamination exist. In the use of sterile towels for drying, these opportunities are the greatest. Improper rotation of the towel during drying, the touching of the scrub suit or of the unscrubbed portions of the upper extremities, all offer great probabilities of gross contamination.

It would seem that simple air drying of the hands would eliminate these probabilities of contamination. Such a method further has the advantage of elimination of more costly methods of drying. However, it is slow, physically uncomfortable, and may cause chapping of the skin. It could be followed by dust-laden air contamination in relatively dry operating rooms.

To overcome all these difficulties, it seemed to us that the mechanical air dryer had definite possibilities. Before accepting such a device for use, however, it had to be determined

whether or not the forcing of warm air over the extremities would increase contamination, and whether or not it would be economically practicable. This study was undertaken to determine these two points.

Operation of Machine

The air dryer was a standard model manufactured by a national manufacturer, and was not modified for this study. It is a blower mechanism mounted in a white enamel chassis, operated by a small 110-volt motor which forces a current of air over an electrically heated grid. This current of air is directed through a nozzle downward or upward over the extremities. The switch is operated by a trip mechanism mounted on the front, which can be activated by the shoulder or elbow. This mechanism allows the motor to operate for 30-second intervals, but the time can be modified without difficulty. The machine was mounted at a convenient height on a door in the scrub room adjacent to the scrub sinks. We considered this location preferable to any other because of the high moisture content of the air and because of its convenience. Installation of the machine was simple and was done easily by the station electrician.

A standard scrub routine was adopted. Duration of scrubbing, scrubbing solution, and cleansing of nails was the same before each sample was taken. To further standardize the procedure, only the first scrub of the day for each individual was used. No sterile or antiseptic washes or solutions were used except a .66-percent hexachlorophene soap.

In the study on sterile towel-drying technique, the subject after scrubbing walked to the adjacent operating room where he was immediately given a sterile towel by the scrub nurse. He dried his hands in his usual manner. With the air dryer the arms were dried for 60 seconds under the jet of warmed air, the hands being rubbed together as drying proceeded. (With one man the drying period had to be 90 seconds because of his size and heavy hair distribution.)

Following either method, the hands were immersed in a sterile basin containing 1,000 cc. of distilled water and agitated freely. In the first series the water was allowed to run down

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the elevated forearms into the basin. Since this was thought to be a possible source of contamination from water running over the unscrubbed upper arm, this step was eliminated in the second series.

The laboratory procedure was as follows: A 1-cc. sample was taken from the basin of sterile distilled water and added to 20 cc. of nutrient agar in a sterile flask. This was mixed thoroughly and then poured into a Petri dish. After overnight incubation at 37° C., the number of colonies on each plate were counted and recorded.

Contamination

Air samples for bacterial contamination were taken in two operating rooms and in the scrub room for the first 9 days of the study. Since results were so variable and there was no correlation with the other results, this study was abandoned.

Eleven surgeons and six nurses participated in the first study. The surgeons were mixed staff, residents, and interns. One of the nurses was a novice. As shown in table 1, 77 towel-drying cultures and 77 air-drying cultures were taken from this group.

In this group it is to be noted that if colony counts of 50 or over are considered as gross contamination, then 12 subjects in the towel-drying group were so contaminated and only 3 in the air group. If 100 colonies or over are considered as gross contamination, none of the air-dry group and 9 of the towel-dry group were so contaminated.

In the second series, as shown in table 2, three doctors and two nurses were used, each of whom had 15 air-dry and 15 towel-dry cultures. The technique was modified in this group, as mentioned heretofore, in that the hands only were immersed in the solution.

In the second series group the differences are not so great because the subjects were selected and more experienced personnel whose technique might be expected to remain the same from day to day. Here again, however, if 50 colonies per cc. or over is considered gross contamination, the ratio of towel to air is 11 to 4; in cultures showing 100 or more colonies the ratio is 1 to 0.

If presented somewhat differently and combined as in table 3, the differences are more significant. If colonies showing 50 or more are taken, the ratio of contamination of towel to air is 23 to 7. If colony counts of over 100 are

Table 1. Series I

Subject	Number of cultures		Average number colonies		Difference	Number of cultures over 50 colonies	
	Towel	Air	Towel	Air		Towel	Air
Surgeon No:							
1	5	5	11	7	4	0	0
2	1	1	5	0	5	0	0
3	5	5	6	10	¹ -4	0	0
4	5	5	64	18	56	3	0
5	5	5	13	18	-5	0	0
6	5	5	54	18	36	3	1
7	5	5	0.8	5	¹ -4.2	0	0
8	3	3	18	1	17	0	0
9	5	5	6	50	¹ -44	0	2
10	5	5	20	0.4	19.6	1	0
11	4	8	5	7	¹ -2	0	0
Nurse No.:							
1	7	6	28	5	23	1	0
2	4	1	3	9	¹ -6	0	0
3	5	5	13	6	7	0	0
4	3	2	67	3	64	1	0
5	5	6	39	9	30	2	0
6	5	5	36	22	14	1	0

¹ Minus sign used to show instances of larger number of colonies by air drying.

Table 2. Series II

Subject	Number of cultures		Average number colonies		Difference	Number of cultures over 50 colonies	
	Towel	Air	Towel	Air		Towel	Air
Surgeon No.:							
1-----	15	15	23	24	¹ -1	2	3
2-----	15	15	0.6	1.6	¹ -1	0	0
3-----	15	15	40	19	21	5	1
Nurse No.:							
1-----	15	15	15	10	5	2	0
2-----	15	15	16	3	13	2	0

¹ Minus sign used to show instances of larger number of colonies by air drying.

taken, the ratio is 10 to 0. It is believed that these figures are probably significant and indicate that gross contamination by the mechanical air dryer is apparently less common than by sterile towels.

Cost of Machine

The cost of the machine was \$140. Installation cost was negligible and installation was done by station labor. The maintenance cost will probably be negligible for approximately 5 years. On the other hand, we estimated that we used in this hospital yearly an average of 10,000 towels for hand drying alone. Laundering cost was estimated by our laundry superintendent as being about \$90 yearly. Replacement due to wear and tear ap-

proximates about 100 towels a year at an estimated cost of \$20. Adding to this the cost of folding and pack make-up, the saving over a period of 5 years is obvious.

The dryer tested can be used satisfactorily in its present form. For convenience, however, the trip mechanism should be adjusted to 90 seconds. The manufacturer has advised us that this can be done without extra cost. For added convenience a foot-operated mechanism could be built. This, however, would add somewhat to the over-all cost of the machine. We considered at first the installation of a filter in the mechanism, but in the light of our studies we do not consider this feature necessary. It would entail certain technical difficulties and added expense that are probably not indicated. Further studies with a filter, however, would be of interest to see if bacterial counts could be reduced still further.

Table 3. Total figures for both series

Number of colonies	Number of cultures	
	Towel dry	Air dry
0-5-----	77	92
5-10-----	21	14
10-20-----	14	18
20-50-----	17	21
50-100-----	13	7
Over 100-----	10	0
Total-----	152	152

Conclusions

1. Bacteriological studies of 304 cultures, taken from groups of surgical personnel after use of a standard scrub technique, showed a probably significant reduction of gross contamination of the hands when a mechanical air dryer was used.

2. The mechanical air-drying technique is less expensive than the towel-drying technique.

Histoplasmin and Tuberculin Sensitivity In Texas Infants and Children

By GILBERT B. FORBES, M.D., and CHARLES C. CHANG, M.D.

HISTOPLASMOSIS, a disease of variable symptomatology caused by the fungus *Histoplasma capsulatum*, was first described by Darling in 1906 (1). The disease has received increasing attention during the past decade. An increasing number of clinical instances of the disease are being recognized. In 1941, a histoplasmin skin test was developed (2, 3). And in 1945 researchers reported that a large number of tuberculin-negative individuals with roentgenographic evidence of pulmonary calcification reacted to the skin test antigen, suggesting that a benign form of the disease exists (4).

Extensive skin test surveys have revealed that the percentage of positive reactors among the young adult population is highest in the Ohio, Missouri, and lower Mississippi valley regions and tends to fall off rather sharply with increasing distance from this area, the values varying from 88 percent positive reactors in Kansas City, Mo., to less than 5 percent in the northwest and extreme southeastern parts of the United States (5-7).

In 1951 histoplasmin skin tests were done on 441 infants and children born in Texas. The

subjects were selected at random from patients on the wards of the Children's Medical Center, patients attending the out-patient clinic, and from the pediatric patients seen at Parkland Hospital and St. Paul's Children's Hospital, all in Dallas, Tex. Infants cared for at a nearby foundling home and older children hospitalized at the Scottish Rite Hospital for Crippled Children were also included. The subjects ranged in age from a few days to 16 years. The skin testing program was conducted during the period from April to August 1951.

Material

The histoplasmin (lot H-42) was obtained from the Division of Chronic Disease and Tuberculosis, Public Health Service. It was in the standardized dilution of 1:100. Tuberculin tests were made simultaneously, using old tuberculin in a strength of 1:1000 (0.1 mg.).

The histoplasmin injection (0.1 cc.) was made intradermally on the volar surface of the left forearm, while that of the tuberculin (0.1 cc.) was made on the volar surface of the right forearm. Separate sets of needles and syringes were used. The reaction was read 48 hours after the injection and was considered positive if the area of induration was 5 mm. or more in diameter, without regard to erythema.

Results

Among the 441 histoplasmin and tuberculin tested children, there were 31 positive histo-

Dr. Forbes is chairman of the department of pediatrics, Southwestern Medical School of the University of Texas, and Dr. Chang is now resident house officer, Willard Parker Hospital, New York City. Dr. Jerry E. Miller, clinical associate professor of radiology of the Southwestern Medical School, interpreted the roentgenographs.

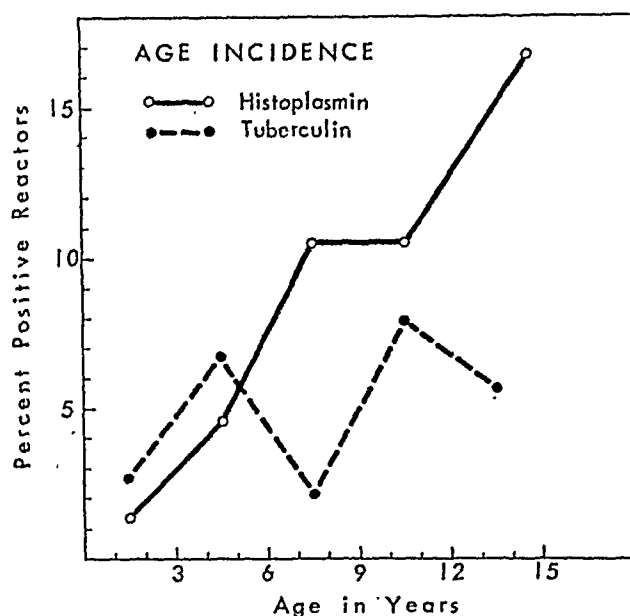
plasmin skin tests and 20 positive tuberculin skin tests, an over-all incidence of 7.0 and 4.5 percent, respectively. Two children reacted to both histoplasmin and tuberculin. The total number and percentage of positive results were further grouped according to sex, group, birthplace, and type of disease on admission to the hospital or clinic (table 1).

Although there are minor differences in both tuberculin and histoplasmin sensitivity among the three groups and between sexes, these differences are not statistically significant. Individuals born and reared in the rural areas of Texas would appear, at first glance, to have a definitely higher degree of sensitivity to histoplasmin than Dallas residents, but this difference also is not significant statistically. Nor is there a significant difference ($P=0.08$) in histoplasmin sensitivity between individuals suffering from some chronic disease and those who exhibited no disease at the time of testing.

Roentgenograms of the chest were taken for each child who showed either a positive tuberculin or a positive histoplasmin skin test, or both. Of the 20 subjects with positive tuberculin tests, 9 (45 percent) had pulmonary calcification. Among the 31 with positive histoplasmin tests, 8 subjects (25.8 percent) had roentgenographic evidence of pulmonary calcification.

In studying the influence of age on both histoplasmin and tuberculin sensitivity, we find a trend toward increased histoplasmin sensitivity as the subjects become older; indeed none of the 94 subjects in the 0-2-year age group exhibited a positive test. The pattern of tuberculin posi-

Effect of age on histoplasmin and tuberculin sensitivity, 441 Texas children



tivity is much less regular and shows no consistent age variation (table 2). The effect of age on histoplasmin sensitivity can be seen better in the chart where the subjects are divided into larger age groups on an arbitrary basis.

Discussion

Palmer observed 21 (34.4 percent) positive histoplasmin reactors among 61 Texas student nurses (6). Christie and Peterson in a survey of histoplasmin sensitivities at Vanderbilt University recorded 7 positive tests (25.9 percent) among Texans (4). Beadenkopf and his associates, working at the University of Chicago,

Table 1. Comparative incidence of sensitivity to tuberculin and histoplasmin related to sex, race, birthplace, and type of disease on admission to hospital or clinic

Number and percentage	Sex		Group			Birthplace		Type of disease		
	Male	Female	White	Negro	Latin-American origin	Dallas	Non-Dallas	Acute	Chronic	None
Total number.....	227	214	258	138	45	228	213	165	225	51
Tuberculin positive:										
Number.....	11	9	13	4	3	13	7	6	12	2
Percent.....	4.8	4.2	5.0	3.0	6.7	5.7	3.3	3.6	5.3	3.9
Histoplasmin positive:										
Number.....	18	13	22	5	4	8	23	9	21	1
Percent.....	7.9	6.1	8.5	3.6	8.9	3.9	10.8	5.5	9.3	2.0

found an incidence of 30 percent among 100 students who had resided in the State of Texas for most of their lives (7). In a study of 200 adults at the Parkland Hospital, Dallas (both in-patients and the hospital personnel were tested), an incidence of 31 percent positive reactors was observed (8). All of these studies were done on adults or individuals in the late teens. Except for Chapman's series, none of the individuals tested were living in Texas at the time the test was made.

Comparison of our results with those reported for children from the St. Louis, Mo., area (9), reveals that the increase in percentage reactors with age is less precipitous in the Texas series. For example the incidence of positive reactors in the 3- to 6-year-old St. Louis group is approximately four times that of the comparable age group of Texas children, and there is a threefold difference in the 6- to 12-year age group. Consequently, it would appear that individuals of all ages have a higher incidence of

histoplasmin reactivity in the St. Louis area than individuals in the region around Dallas.

It is of interest that none of the patients in our series was considered to have clinically manifest histoplasmosis.

Summary

Histoplasmin and tuberculin skin tests were performed on 441 infants and children whose birthplace and principal residence was in Texas. Most of the patients studied lived in Dallas or the immediate surrounding territory. A significant degree of relationship between age and histoplasmin sensitivity was noted.

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Table 2. Incidence of tuberculin and histoplasmin sensitivity related to age

Age (year)	Total num- ber	Tuberculin		Histoplasmin	
		Num- ber	Percent positive	Num- ber	Percent positive
0-1-----	57	1	1.8	0	0
1-2-----	37	2	5.4	0	0
2-3-----	52	1	1.9	2	3.8
3-4-----	30	3	10.0	1	3.3
4-5-----	25	0	0	1	4.0
5-6-----	33	3	9.1	2	6.1
6-7-----	28	0	0	3	10.7
7-8-----	32	0	0	1	3.1
8-9-----	35	2	5.7	6	17.1
9-10-----	28	1	3.6	5	17.9
10-11-----	30	5	16.7	3	10.0
11-12-----	18	0	0	1	5.6
12-13-----	16	2	12.5	3	18.8
13-14-----	12	0	0	1	8.3
14-15-----	8	0	0	2	25.0



Public Health in the Western States

By WILTON L. HALVERSON, M.D.

PUBLIC HEALTH services in the western States and Territories have developed remarkably since the organization of the Western Branch of the American Public Health Association 23 years ago.

The rapid increase of the population of the West and the resulting industrial expansion, accentuated by the production requirements of World War II and the present situation, have been accompanied by tremendous health, social, and economic problems, the solution of which is taxing our resources. It requires the best combined efforts of every individual who finds himself a part of the movement.

On the West was placed the responsibility of providing a tremendous amount of war materials, since the war requirements were far greater than the potential capacity of the eastern and midwestern production centers. The danger of overconcentration of industry in any section of the country was an additional and potent reason for the decentralization of the shipbuilding and airplane industry. The West offered labor reserves and natural resources that could not be ignored. California's war contracts, for example, were larger than those of any other State for about 2 years.

With the end of actual fighting and the fulfillment of war contracts, the expected large-scale unemployment and an exodus of workers

to their former homes in the Midwest and the South did not occur. On the contrary, the population increase continued almost unabated. Thousands of war veterans who had spent months in the training camps in the West decided to make the West their permanent home. And industry, quick to see the advantage of manufacturing commodities near the place of consumption, converted war plants to peacetime production.

The public health profession is particularly challenged not only by the problems posed by the physical characteristics of the area, such as the limited water resources in a large part of the West and the rapid industrialization of its centers, but also by the country's entrance into a new phase of scientific development, the atomic age. Atomic development comes at a period when time and space have been compressed by transportation of a speed surpassing sonic limits and a time in history when world peace is uncertain.

What part will the public health profession of the West play in such a time as this? Will we stay with the stereotyped and traditional aspects of our "basic six," or will we stir into an awareness of the problems confronting us now and think and plan for the eventualities of this year and the years to come?

There are many problems for which we must find solutions if we are to discharge the responsibilities society has placed upon us.

Atomic Energy Control

In atomic energy we have probably the most significant and potentially dangerous processes to which society has ever been exposed. Dr.

Dr. Halverson, director of public health of the State of California, is president of the American Public Health Association. This article is based on a paper presented at the annual meeting of the Western Branch of the Association, Denver, Colo., June 1952.

Abel Wolman has pointed out: "In the place of a few radium dial painters doing standardized work . . . thousands of workers now perform hundreds of tasks in the vicinity of materials releasing much more radiation than man has ever known before. . . . Some idea of this total rapid advance may be obtained from the fact that less than 10 years ago approximately 3 pounds of radium were under human control. Today radioactive materials are being produced and in many instances are being used to the equivalent of millions of pounds of radium" (1).

The interest and concern of the public health worker should not await the solution of all of the inherent problems. This may take a long time in such a complex field, and in the meantime hundreds of deaths may take place. Like any other problem, it requires analysis and action on the basis of the best available evidence. The epidemiologist, for example, will in this case be concerned with the amount, type, and period of radiation rather than with the types and virulence of bacterial infection. "The sanitary engineer must think about the number and size of processing units which require water supply, heat exchange, drainage, air conditioning, and ventilating equipment" (2).

Information regarding the distribution of radioisotopes, which has grown from a few hundred shipments in 1946 to several thousands annually, is made available to State health departments by the Atomic Energy Commission. The only information withheld from the States relates to shipments for classified uses.

The Atomic Energy Commission has been careful to supply the user with information regarding toxicity of the materials and the length of safe exposure. In spite of these precautions mistakes can be made and accidents may occur. In California a drum of radioactive cobalt accidentally fell from a truck. Fortunately, it was picked up by students who understood its significance and returned it to the laboratory. In another instance, a medical technician in a southern hospital was conducting analytical procedures with a radioactive substance in a manner which was subjecting her to total radiation of many times tolerance (1).

Are waters used for cooling properly protected from radiation or if exposed are they properly safeguarded? Are industrial wastes

from establishments using these products properly controlled so as to prevent harmful contamination to people in the general area and to life in general? These are questions of prime importance to the public health.

While the information made available to the public has sometimes been overdramatized, the evidence available is sufficient to indicate the great importance of establishing control programs.

This is a field which requires careful exploration before administrative action is taken. California is in the process of this phase of the work. Following consultation with the Public Health Service, the State health department has assigned primary exploratory responsibility to an engineer who will, with the help of a staff advisory committee and other experts, outline a program of control which the department will recommend to the governor and the legislature for action.

Health departments, particularly in the more populous States, can no longer allow events to take their natural course in this urgent problem.

Occupational Health

With the rapid industrialization of the West, we must give greater consideration to, and develop a broader interest in, the health of the worker. Our industrial growth is not simply an increase in size. It also relates to the development of new substances and new processes, the toxicity and potential danger of which in many instances have not been defined.

Hundreds of new chemicals are being introduced to control agricultural and domestic pests. A knowledge of the toxicology of parathion, a powerful and effective insecticide—one of the so-called nerve poisons—is of great importance in the protection of workers both in the factory and in the field. New materials and new methods are coming with such regularity and rapidity that we can apply the simile which so aptly described the golden age of bacteriology—they come like corn popping in a pan. This is truly the age of chemistry and physics, just as the last half of the last century was the age of bacteriology.

At the last meeting of the California Conference of Local Health Officers and of the Cali-

ifornia State Board of Health, we discussed the control of the chemical, lindane, an insecticide that can pass directly from the solid to the gaseous state, the speed of this transfer depending on the temperature of the solid.

An enterprising and well-financed company has developed a business based on the distribution of thermogenerators for the dissemination of lindane or other pesticides in eating places and other closed areas where insects are a nuisance. The question of hazard through inhalation and food contamination immediately confronts us and requires that a decision be made as to whether this method of insect control shall be regulated or prohibited.

So many new occupational health hazards are being introduced that industrial hygiene workers can scarcely become familiar even with the names of the new substances. While we are greatly concerned about the specific occupational health problems that relate to the worker's environment, we are also concerned about his general health and to this end should be developing methods and procedures to make available the various established health services.

It is timely that we think of industrial health in terms of general health, particularly because of the developing interest in chronic diseases and the accumulating knowledge, small as it is at present, about what can be done to prevent chronic disease and to prevent to some degree the premature disabilities these conditions bring about.

Labor and industry are approachable in this matter, and in some instances they are ready to work with public health agencies in developing programs which will conserve the already short labor supply and which can lighten the load of workmen's compensation by protecting the health of the worker through well-planned preventive programs.

Chronic Disease Control

Chronic disease control is a controversial subject in many ways. Can a measurable amount of disability be prevented by early diagnosis and preventive measures? Should health departments be concerned with personal health only as it relates to contagious disease and the special field of maternal and child health? Are multiphasic screening tests profitable and

effective? These elementary questions and many others require practical answers.

The Commission on Chronic Illness, jointly sponsored by the American Hospital Association, the American Medical Association, the American Public Health Association, and the American Public Welfare Association, has stated: "The basic approach to chronic disease must be preventive. Otherwise, the problems created by chronic diseases will grow larger with time, and the hope of any substantial decline in their incidence and severity will be postponed many years" (3).

Weight control is a specific preventive measure related to chronic illness. Public health agencies, both voluntary and official, can unite with other community organizations in planning a program which, if effectively carried out, can add productive healthful years particularly to those above middle age. Several health departments have already initiated such programs and undoubtedly others will marshal their nutritionists, health educators, and other workers to take aggressive action in this area of chronic disease prevention, which lends itself to the mass as well as the individual approach.

Much has been written concerning the relationship of health departments with the private practitioner of medicine. As the years have gone on, most health departments have developed a working relationship with medical societies and with such specialized groups as pediatricians and obstetricians. These working relationships have contributed much to the success of preventive programs. They have convinced most physicians that the purpose of the health department is not to foist "socialized medicine" on the community but to unite with physicians and hospitals in bringing to the community the advantages of preventive services when this is feasible.

In the development of the preventive aspects of the control of chronic illness, this close working relationship is vital. State and local health departments have here a unique opportunity to bring before medical societies the newer developments related to prevention. When this has been done, progress has been made not only in attaining immediate objectives, but also in developing good working relationships in other parts of the public health program.

Here too is an opportunity to develop the interest of a State or local health council. Here is an objective which challenges the interest of almost every family in the community, for a great many have had the problem of caring for a close relative who has spent months or years the living victim of a chronic illness which perchance might have been prevented. It is a problem which each year results in an ever-increasing financial burden to the home, the county, and the State. Public health workers share with the community and private practitioners of medicine the responsibility of finding ways and means to reduce this financial and social burden by the application of preventive measures as they become available.

International Health

In addition to the responsibility we owe to our community, our State, and our Nation, there is an international responsibility. The United States fully supports the program of the World Health Organization, a specialized agency of the United Nations created for the purpose of improving the health of the people of all nations. And for 10 years we have participated in bilateral cooperative health programs in Latin America, administered by the Institute of Inter-American Affairs. Congress has subsequently adopted the policy of providing technical assistance, including health programs, in other underdeveloped countries. In addition to the 17 countries of Latin America, health missions have been established in Liberia, Greece, Turkey, Iran, India, and all of the countries of Southeast Asia. These bilateral programs are increasingly coordinated with the WHO programs (4).

From my own experience in surveying the health and sanitation program of the Institute of Inter-American Affairs, I am convinced that the public health movement in Latin America

has been materially advanced and that there is tangible evidence of appreciation of the help that has been given.

I am also convinced that if the United States is to continue successfully the policy of technical assistance in the field of public health, ways and means must be found to use health personnel of State and local health departments, medical schools, public health schools, voluntary health organizations, private physicians, and all of the other health resources of the various States. Some plan must be developed which will make it possible for health workers to be released for periods of foreign service in order that the programs may be conducted effectively, with credit to the health profession and to our country.

Public health workers can no longer be content and satisfied to restrict their interests to traditional public health services in this country in the face of the crying needs of a world at the crossroads. We must indeed continue to carry on these programs and in addition we must accept the responsibility of developing new and needed programs at home and be willing on call to assist our world neighbors in taking their early steps in the development of health services.

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Health Conservation Activities of TVA

By O. M. DERRYBERRY, M.D., M.P.H.

THE WIDELY reported accomplishments of the Tennessee Valley Authority in regional resource development have involved many practical applications of the art and science of modern preventive medicine and public health. It was early recognized that the program would necessarily be concerned with health in two different areas: one, the health and safety of its employees; the other, the impact of its major activities on health problems of regional significance. Responsibility for both interests has been centered in a single administrative unit of TVA, the division of health and safety.

An important factor in TVA's success in the health field as well as in other fields has undoubtedly been the flexible management system under which the program operates. Former Chairman David Lilienthal described the essential characteristics of the system as follows: "... a Federal autonomous agency with authority to make its decisions in the region; ... responsibility to deal with resources as a unified whole, clearly fixed in the regional agency, not divided among several centralized Federal agencies; ... a policy fixed by law that the Federal regional agency work cooperatively with and through local and State agencies" (1).

Dr. Derryberry is director of health of the Tennessee Valley Authority. This paper is a revision of the material he presented at a seminar conducted by the University of Pittsburgh School of Public Health in April 1951.

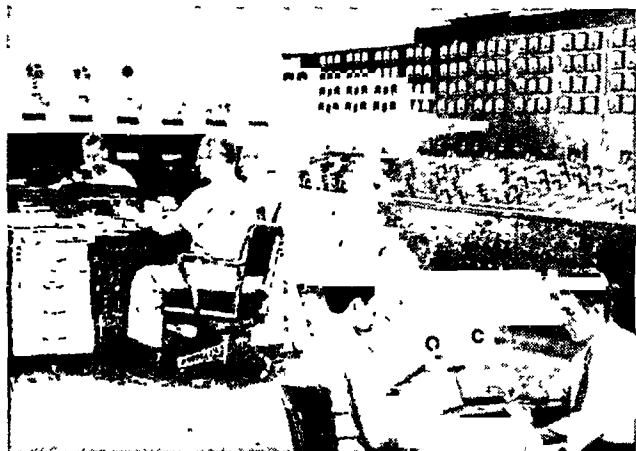
Employee Health and Safety

Appropriate as objectives of a sound program of employee health and safety services are the "three declared purposes of public health" named by Dr. Haven Emerson and Dr. Thomas Francis, Jr., at an informal conference called in March 1951 to consider future directions of public health. These objectives are "to develop and improve health among our people, to protect them against preventable diseases, and to prolong the average length of life in terms of both quality and quantity."

The TVA employee health and safety program includes preplacement medical examinations, immunization service, periodic health examinations, health education and guidance, prevention of accidents, medical and engineering control of occupational health hazards, and mental hygiene services, along with treatment and rehabilitation of the industrially disabled worker. It is viewed as a dynamic management service undertaken to promote efficiency and economy through the conservation of employee health and as a valuable part of good employee-management relationships. Protection of the health and safety of workers is a responsibility of management recognized by the workmen's compensation laws. Management does not, however, always recognize that provision of this service is also an opportunity to protect its investment in the effective manpower so necessary for successful operation in a highly competitive economy.

To the difficulties ordinarily encountered in the administration of a program embracing these functions must be added, in TVA, the

Vision testing of employees in a powerhouse, a measure which promotes efficiency and aids in the conservation of sight.



factors of dispersion of employees over an area covering 80,000 square miles, a great variety of high-risk occupations in which employees must be carefully placed so that their assignments will be within their physical capacity, and the necessity for developing methods by which the services of State and local health agencies and community medical services may be effectively utilized. At locations where large numbers of TVA employees are concentrated, most of the services are provided through field units operated directly by TVA. The services of local and State health agencies are, however, utilized to the greatest extent feasible. Immunizations, chest X-ray surveys, laboratory service, and communicable disease control are examples of services provided from this source.

Not the least among the tasks to be accomplished in carrying out an employee health and safety program is the enlistment of the cooperation, support, and participation of the operating divisions of the organization. Where supervisors in the construction division, the chemical engineering plant, or the power plant, for example, participate actively in identifying needs for health and safety service and in developing plans to meet those needs, inevitably a better job is done than could be done by the division of health and safety alone. This approach also permits sharing on a broader basis the satisfaction of having determined the need for action and of having taken it.

Sometimes a problem in learning to share responsibility is also encountered within the organization directly responsible for provision of health services. This problem arises principally from the fact that in matters of health the traditional role of the physician has been authoritarian. It is not always easy for him to realize that in preventive and industrial medicine and in public health the medical sciences are but a part of the total technology which must be applied to achieve maintenance of health and prevention of disease and disability.

Services Provided

Figures on the number of services TVA has provided show that its interest in employee health has been realistic. Between November 1, 1933, and July 1, 1952, well over half a million medical examinations were performed; more than 400,000 immunizations against communicable diseases were provided; over a million health maintenance services, including professional consultations, were made available; and about a million job-related injuries were treated. In addition, more than 550,000 clinical diagnostic laboratory services were furnished, and over 90,000 dental hygiene services related to specific occupational disease hazards were given. Until venereal disease treatment was simplified by the establishment of rapid treatment centers and by the provision

Testing hearing of an employee to insure his fitness for work that requires good hearing.



Industrial hygiene laboratory, Wilson Dam, Ala. The section shown is devoted to fluorine studies in connection with the operation of the Tennessee Valley Authority chemical plant.



of widespread services through State health departments, over 100,000 venereal disease treatments were administered.

Some appraisal of the qualitative effect of the services can be made by such observations as the number of employees with physical defects who benefited from occupational placement and the number of referrals and corrections made following periodic health examinations. For example, at one Tennessee Valley Authority construction project 15 percent of the 2,344 employees were selectively placed in jobs having requirements compatible with their physical limitations as determined by employment medical examinations. Periodic medical examinations have found as many as 50 percent of the employees examined to have some condition for which corrective advice or treatment was indicated and referral made. Also significant is the fact that not a single case of smallpox or typhoid has been known to occur at a TVA construction camp.

The accident frequency rate was lowered from 62.5 accidents per million man-hours worked in 1935 to 5.5 accidents per million man-hours worked in 1951. Accident severity was reduced from 6.95 days lost per thousand man-hours worked in 1935 to 1.45 days lost per thousand man-hours worked in 1951. During this time the employee population of TVA varied between about 12,000 and 42,000, with an average of about 15,000. It is a matter of simple arithmetic

to calculate the saving in the cost of accidents effected by these reductions.

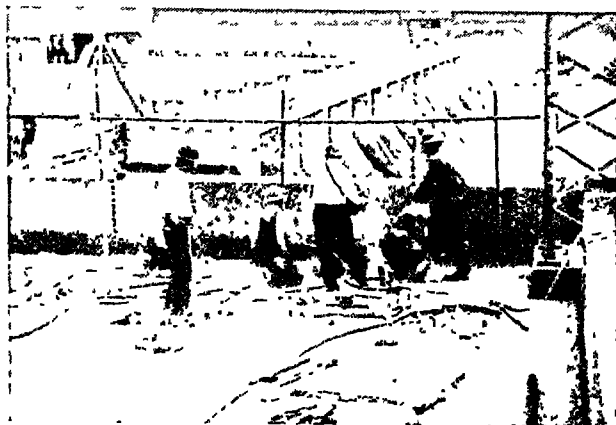
The application of the preventive concept to all phases of the development of projects from planning through construction and operation, the masterful job in safety education done by technicians in collaboration with supervisors, and the close integration of the interests of preventive-minded safety engineers and industrial physicians have all undoubtedly served "to develop and improve health among our people, to protect them against preventable diseases, and to prolong the average length of life in terms of both quality and quantity."

Malaria Control

By direction of the TVA act, water control in the Tennessee Valley is undertaken "primarily for the purposes of promoting navigation and controlling floods" and to produce, transmit, and sell power "so far as may be consistent with such purposes." But the effects of water control inevitably are not limited to navigation, floods, and the generation of electric power. Water control, accomplished in the river channel by the construction of dams and reservoirs and on land through readjustments in agricultural practice and extension of forestry development, has had a significant impact on several regional health problems, one of which is the control of malaria.

In 1933, when TVA was established by Con-

Safety on the job. Employees are wearing "hard hats," goggles, respirators. Dust from extensive drilling operations is controlled as necessary by a "wet drilling" process.



Use of helicopter for larvicidal operations (Kentucky Reservoir)—an example of the newer and cheaper methods employed by TVA in the control of malaria. The helicopter is also used for power transmission line patrol during periods when larvicidal operations are not required.



gress, no one had ever heard of an integrated chain of man-made lakes with a shore line of more than 10,000 miles, which is the Tennessee River today. No one had ever envisioned the problem of malaria control on such a vast expanse of impounded water in an area where malaria is endemic. TVA's experience in the progressive development and application of new methods for the prevention and control of malaria on impounded waters is perhaps its best documented and most widely known accomplishment in the field of preventive medicine and public health.

Before TVA came into being, it had been well established that increased prevalence of malaria followed impoundment of waters in areas of the southeastern United States where malaria was endemic unless effective preventive measures were taken. A house-to-house malaria survey made in 1934 in one of the areas of northern Alabama where a TVA reservoir was under development revealed from 20 to 60 percent positive blood films, with an over-all average of about 30 percent positive. There was no escaping the conclusion that malaria was endemic in the Tennessee Valley and that its prevention and control would be a major problem.

TVA immediately accepted its moral obligation to prevent, insofar as possible, the ad-

verse effects of impoundment of water while at the same time promoting the beneficial effects. Using as a guide such State health department regulations governing the impoundment of water as were then in existence, TVA began its program of planning and developing increasingly more effective and economic methods for preventing and controlling malaria. Planning began on the drafting boards, where the water control structures were designed in such a way as to make naturalistic control measures feasible. Other plans included clearing the reservoirs of timber, providing for marginal drainage by connecting marginal depressions with the main body of the reservoir, and developing operating bases for the application of larvicides in areas which were expected to produce the *Anopheles quadrimaculatus*.

These were the principal control measures known in 1933. Subsequent advances included refinements in methods of reservoir preparation; continuous improvements in methods of applying larvicides; development and application of new larvicides; ecological studies of *A. quadrimaculatus* larvae and adults and the establishment of more effective control of mosquito breeding through planned water level management schedules; and development of a reservoir design to facilitate mosquito control. This reservoir design involves determining areas along the margin that can be remodeled by a combination of deepening and filling and other areas that can be diked and dewatered during the mosquito season.

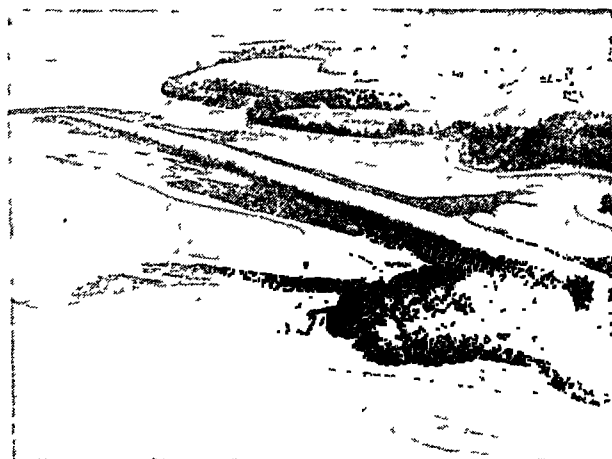
Through all these steps the TVA team of medical malariologist, sanitary engineer, and biologist had the cooperation and support of the official health agencies. Interest in the control of malaria beyond the zone of influence of TVA reservoirs was quick to spring up. Co-operative efforts resulted in the study of the malaria problem on a county-wide basis in all the counties of northern Alabama. Co-operative effort was also responsible for an extensive program of health education, centered around malaria transmission, in elementary schools, high schools, and teacher-training institutions in the sections of the valley where malaria was most prevalent. Time and time again the staff of the State education department, the State health department, and TVA collaborated in

workshop, community health education programs, and demonstration activities.

Reservoir by reservoir the magnitude of TVA's control problem increased. Step by step the TVA team made headway in the improvement of old methods, the discovery of new methods, and the reduction of costs. Ideas first studied in the laboratory were taken into the field for trial if there was the faintest hope of success. Methods withstanding the preliminary field tests were put into effect on an area demonstration basis. Those proving successful there were incorporated into the program of malaria prevention and control, where they held their place only as long as they could satisfy the tests of merit and efficiency. In 1949 and 1950 malaria surveys in selected areas around the most likely mosquito-breeding locations in TVA reservoirs failed to reveal a single parasite-positive slide. Careful field investigations in 1951 and 1952 failed to produce a single case of malaria of natural indigenous origin, although they did reveal a few cases of probable Korean origin.

The general decline in malaria prevalence in the southeastern United States during recent years has relieved considerably the pressure under which TVA has had to carry on its malaria control operations, but it has not led to a relaxation of vigilance nor to false complacency. That smoldering coals of malaria prevalence have been known to flare into disastrous epidemic outbreaks is not new to epidemi-

Remodeled reservoir margins showing filling and deepening work to facilitate malaria control (Wheeler Reservoir in northern Alabama).



Corrosion of turbines due to acid waste in Ocoee River. Pollution in this river has since been largely brought under control.



ologists. TVA has no desire to become newsworthy from neglect of its responsibility to prevent malaria transmission as a result of impoundments.

Stream Sanitation

The conversion of a flowing river into a series of impounded reservoirs and the changes in the chemical, physical, and biological characteristics of water following impoundment provide the basis for TVA's interest in stream sanitation, another regional health problem.

Man has long been torn between a struggle of conflicting stream sanitation interests: one seeking to maintain streams in their natural state of purity; the other attempting to use the streams as a convenient sewer for disposing of the end products of man's physiological and industrial processes. Somewhere a balance among the many reasonable and proper uses of water must eventually be found. Balanced use must take into consideration such items as public or industrial water supplies, fish and wildlife propagation and conservation, recreational activities, power development, flood control, erosion control, discharge of industrial wastes and domestic sewage, irrigation, and perhaps others. Development of a stream sanitation program requires identification of either limited or fundamental conflicts among different water uses, a resolution of these conflicts if possible, and the establishment of a fair, reasonable, and coordinated plan which will achieve and maintain a continuing balance among the various interests.

Safe drinking water on the job is a "must" for TVA projects. Here, a sample of water is being tested at one of the construction projects.



Since 1936, TVA has actively engaged in a program to promote the prevention and control of pollution in the Tennessee River system. The objective has been the protection and general development of the value of water as a basic physical resource of the region. At about the time interest began to crystallize into action, TVA was requested by the State health officers in the valley to undertake a fact-finding survey of the Tennessee River in order to define the pollution problem and obtain the data needed in planning for control. Organized, comprehensive information on the condition of the Tennessee River system was not available, and, furthermore, it was recognized that a program of river development would greatly alter the capacity of the stream to handle pollution.

Critical sections of the Tennessee River and its major tributaries were studied, and surveys of typical industrial plants discharging liquid wastes into the river system were made. As sections of the river system were impounded, the effects of impoundment on stream sanitation were placed under study. Analyses of industrial wastes and estimates of their effect on stream pollution in terms of population equivalents were made; the impact of domestic sewage on the pollution problem was evaluated; the biochemical oxygen demand of various wastes was studied and findings correlated with dissolved oxygen conditions and stratification phenomena in reservoirs. The data compiled can be used to draw a picture of water quality conditions in the river system as they now exist as well as some sketches of what they ought to be from the standpoint of balanced stream sani-

tation interests. From these data can be obtained also some outline of how the job of correction can be done and approximately how much it will cost.

Stream sanitation has been an area of very active collaboration between TVA and other Federal agencies—the Corps of Engineers, the Federal Works Agency, the Public Health Service, and the Atomic Energy Commission. In cooperation with the Atomic Energy Commission, ecological studies are being made in a small tributary impoundment which serves as a stilling basin where certain radioactive wastes are discharged. Collaboration with the Public Health Service, as well as with the States, is currently exemplified by the preparation of several reports on conditions in the Tennessee River Basin. These reports can be most useful to the Public Health Service in connection with its responsibilities under the Water Pollution Control Act of 1948 and will be a valuable aid to those whose duty it is to take corrective and preventive action.

The cooperative effort between the TVA staff and the State health departments has helped to awaken general public interest in stream sanitation in the Tennessee Valley, as evidenced by the passage of legislation relating to stream pollution control in recent years in several of the valley States and by increasing corrective action being undertaken by private industries and public agencies. The job of stream sanitation is by no means complete, however, for many troublesome spots remain. Conflicts between water use interests still exist, and many of the elusive facts concerning the effect of water impoundment on stream quality have not yet been corralled.

Other Health Problems

TVA has also been concerned with such health problems as provision of water supply and sewage disposal systems in its temporary construction villages; sanitary supervision of food-handling establishments serving construction workers living in dormitories; investigation and control of communicable diseases; provision of a safe milk supply; and sanitation of temporary housing developments and trailer camps. These needs have been met largely through close collaboration with official health agencies since

TVA is without authority except on property which it owns and controls. Where there was no organized local health unit in existence, TVA has frequently pooled its resources with those of the local area and of the State health department to help establish or strengthen a full-time local health department. As TVA construction wanes, the support of these services is in most instances being assumed by the communities and the States.

Though many of these health problems have been transitory, TVA has remained in the public water supply business on a large scale. It presently operates 30 water treatment plants at TVA dams and reservations. To the greatest extent feasible, TVA relies upon official health agencies to supervise these installations but must itself maintain a degree of surveillance over them in order to discharge its responsibility for protection of employees and the visiting public. Similarly, most of the services to recreational developments along TVA lakes have now been taken over by local health departments.

Another health problem to which TVA is giving attention is that of atmospheric pollution. In developing plans for new steam-operated generating plants to meet the increasingly urgent demands for power in the Tennessee Valley, TVA is giving careful study to

the potential problem which may be associated with the discharge of fly ash, fumes, gases, and other waste materials so that necessary controls may be included to the greatest extent possible in plant design and construction.

Flexibility and Progress

The events and activities described here were not all, of course, the result of a perfect plan completely conceived in the beginning of the Tennessee Valley Authority. It is doubtful that anyone envisioned all the ramifications which have been a part of the program. Without question, a major factor contributing to TVA's success in dealing with a multiplicity of related interests has been the flexible management scheme at the heart of TVA. With authority and responsibility for leadership in the unified development of the resources of the region clearly fixed in a single agency, the many and complex technical and social problems have been boldly engaged. The result has been outstanding progress in the promotion of human welfare in the Tennessee Valley.

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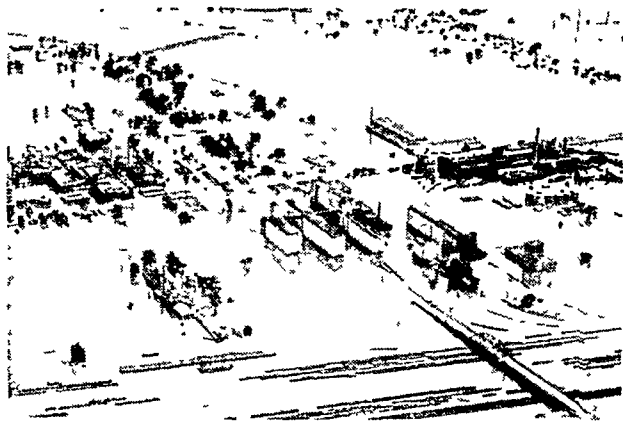
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Insect and Rodent Control In Epidemics and Disasters

By JOHN S. WILEY, M.S.E., and PORTER A. STEPHENS, B.S.

VECTOR-BORNE diseases are an added hazard to humans when, in the wake of floods, storms, earthquakes, fires, and wartime destruction, insects and rodents increase in number. The public health officer should, imme-



Mr. Wiley, a senior sanitary engineer in the Public Health Service, is assistant chief of the vector control and investigations branch of the Communicable Disease Center, where he was in charge of typhus control activities from 1945 to 1949.

Mr. Stephens, a sanitary engineer in the Reserve Corps of the Public Health Service, is with the disaster aid and facility planning unit of the Center's vector control and investigations branch. Since 1942 he has been actively engaged in malaria and typhus control and last year was consultant to the Service's regional medical directors on flood-induced mosquito problems in Nebraska, Iowa, and Utah.

diately after a disaster, or when an outbreak is or may be imminent, evaluate potential hazards from insects and rodents and prepare a plan for controlling them. The danger of disease may not be confined to areas in which there has been a history of malaria, typhus, plague, dengue, or yellow fever. Fly-borne diarrheal diseases, mosquito-borne virus encephalitis, and such rodent-borne diseases as leptospirosis (Weil's disease), rickettsialpox, and lymphocytic choriomeningitis may also occur.

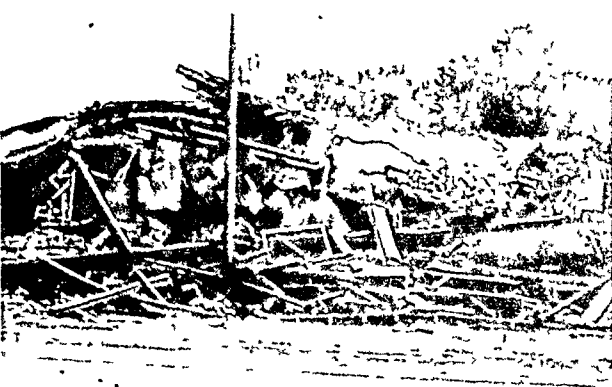
Disasters often disrupt normal sanitation and public utility services and result in temporary relocation of displaced persons. Evacuation of personnel to save lives, application of first aid and medical care, and provision of shelter, safe water, and food are of first importance. Rehabilitation is next in importance to restore normal life to the community. Concerted efforts are required to remove debris and repair buildings and utilities, and to prevent the development of pests, the insects and rodents which carry diseases and seriously affect community activity.

Flies, mosquitoes, and rats, present in most parts of the United States, are hosts and carriers of many diseases in aftermaths of disasters. Especially as flood waters recede, these insects and rodents may multiply in unprecedented numbers.

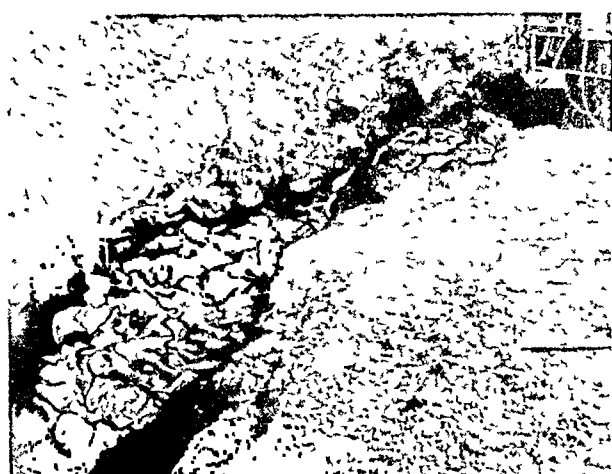
A number of vector-borne diseases may occur in epidemic proportions, particularly after a build-up of the vector populations following a disaster (see table).

The potential build-up of the insect and

Collapsed building and debris resulting from floodwater.



Disposal of flood damaged meat.



rodent vectors depends upon a number of factors: the type and magnitude of the disaster; its geographic location; the season of the year; and existing control measures or the timing of emergency measures for combating the pests.

Fires, floods, and other disasters may temporarily reduce rather than increase the numbers of vectors and pests by killing them or destroying their breeding and harborage areas. However, disasters generally increase the breeding potentials by creating larger breeding and harborage areas. Midwest floods in the summer of 1951 and in the spring of 1952 created extensive water areas suitable for mosquito breeding and left volumes of organic matter in which flies and rats could develop in large numbers.

The geographic location of the disaster area is, of course, a factor determining the danger from specific vector-borne diseases. Malaria, typhus, dengue, and yellow fever would not be expected to develop to epidemic proportions in northern sections of the United States. This may be due to a lack of host or vector, to the absence of infection among inhabitants, or to other conditions which prevent these diseases from spreading. *Anopheles* mosquitoes, *X. cheopis* fleas, and rats all exist in these sections of the country, but their presence would not be expected to result in an epidemic threat of the tropical or semitropical diseases. In southern areas, however, malaria and typhus would be real threats. If a source of infection were introduced, plague, yellow fever, and dengue could break out. Pestiferous insects and rodents may develop in large numbers following a disaster in almost any part of the United States.

The season of the year greatly affects the ex-

Entomologist surveying residual floodwater for mosquito production.



Space spraying of insecticides for fly control.



tent to which vectors and pests develop. Certain fly and mosquito species have short breeding seasons, particularly in the North where normally they do not develop intensively. However, myriads of insects may develop following a disaster during the breeding season, no matter how short it may be.

Whether insect or rodent control measures are warranted, following disasters or during epidemics, depends upon the factors discussed. The period of development may be from 7 to 10 days in the case of mosquitoes and flies. It is therefore essential that entomological surveys and plans should be made as soon as possible after a disaster in order to have personnel, equipment, and materials available as the problem develops.

In a public health insect or rodent control emergency program following a disaster, whether it be to control an epidemic or to prevent disease and discomfort, the State health officer or his designated representative functions as coordinator of all health activities within the State. If the assistance of the Public Health Service is desired, it should be requested of the appropriate Public Health Service regional office by the State health officer. All insect and rodent control measures should be coordinated to secure efficient program supervision. Chemical control measures may vary for each insect or rodent group. Control by sanitation is equally as important as chemical control and may effectively and simultaneously reduce the number of types of vectors. The en-

tire activity should be supervised by a single individual competent in this field of work.

Three brochures have recently been issued by the Communicable Disease Center of the Public Health Service on fly, mosquito, and rodent control in epidemics and disasters (1-3). They deal in some detail with the various recommended control measures which in this article are considered only in a general way.

Fly Control

Required conditions for fly control may be summarized as: (a) during an epidemic of diarrheal disease in an area which has a large fly population or where seasonal breeding will soon begin; (b) following a disaster which occurs during or just at the beginning of the fly-breeding season and which has disrupted the sanitation facilities for disposal of fecal matter and other organic wastes; and (c) under particular conditions related to diseases where transmission by flies is possible.

The health menace and discomfort from flies result from lack or failure of sanitation facilities; therefore, augmentation of these facilities is of primary importance. Vehicles and manpower should be made available at the earliest opportunity for sanitary storage, collection, and disposal of accumulated human excrement and other organic wastes resulting from a disaster. For the control of diarrheal diseases, flies should be excluded from excreta and from human food, which indicates the need for fly-proof disposal pits and for screening of temporary and per-

Disease	Source of infection	Vector
Malaria.....	Man.....	<i>Anopheles quadrimaculatus</i> . <i>Anopheles freeborni</i> <i>Anopheles albimanus</i> .
Dengue.....	Man.....	<i>Aedes aegypti</i> .
Yellow fever.....	Man.....	<i>A. aegypti</i> .
Virus encephalitis.....	Bird, possibly horse.....	<i>Culex tarsalis</i> and other mosquitoes.
Diarrhea and dysentery.....	Man.....	Domestic flies and rats. ¹
Murine typhus fever.....	Rats.....	<i>Xenopsylla cheopis</i> (fleas).
Plague.....	Rodents, man.....	<i>X. cheopis</i> and other fleas. ²
Lymphocytic choriomeningitis.....	House mouse.....	Possibly arthropods occasionally. ¹
Rickettsialpox.....	House mouse.....	<i>Allodermanyssus sanguineus</i> (mite).
Leptospirosis.....	Rats, less often dogs.....	(³).

¹ Transmission also through contaminated food or dust. ² Also transmissible from man to man. ³ Transmitted through the skin, or water contaminated with rat urine or feces.

Adult and larval stage flies produced from animals drowned by flood.



Mixing poison bait for rodent control



manent food-handling establishments. Despite the efficacy of improvised methods to restore sanitation facilities, it is probable that the use of chemicals will be required to (a) supplement the sanitation effort, or (b) abate fly populations until adequate sanitation is restored.

Mosquito Control

In mosquito-borne disease transmission, initial control measures should be directed against adult mosquitoes as the quickest means of intercepting the course of the epidemic. Residual

spraying with a DDT formulation on interior surfaces of occupied dwellings, and sometimes of outbuildings, will effectively destroy the house-frequenting species of recognized disease vectors. Space spray measures may be indicated in certain instances. Larviciding may be necessary to prevent the development of further broods following a disaster.

The current epidemic of mosquito-borne encephalitis in the Central Valley of California furnishes a striking example of the importance of emergency mosquito control measures.

Rodent Control

In the event of a rodent-borne disease transmitted by arthropods, control of the fleas or mites is of first importance. DDT dust applied to rat runs and harborages will effectively reduce the ectoparasites. Rat poisoning is applied to control the rats after the DDT has had an opportunity to kill the ectoparasites. With warfarin, the poison and DDT may be applied concurrently. In the case of diseases transmitted from rat to man without vectors, rat poisoning is instituted immediately without previous insecticide application. If rodents already heavily infest the area, it is important that a relatively quick-acting poison be used before attempting to clean up and restore sanitation. If rats have migrated or concentrated in the disaster area, it may be necessary to move the people to a rat-free area. Finally, the removal of rubbish and debris, and the proper storage and disposal of garbage will deprive remaining rats of food and shelter.

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The Positive Approach To a Tuberculosis Nursing Program

By DORIS E. ROBERTS, R.N.

THE MODERN attack on tuberculosis has made tangible inroads on the control of this disease and gives us reason to look forward to the day when tuberculosis will no longer be a major public health problem. The decline in the tuberculosis death rate, from 45.8 per 100,000 population in the United States in 1940 (1) to 22.5 in 1950 (2), is one evidence of change for the better. We are discovering an increasing number of cases in the earlier stage of the disease; we have more hospital beds for tuberculosis patients than ever before; treatment methods are improving; and rehabilitation services are expanding. Health workers can have a more optimistic attitude toward tuberculosis control today than they could even as recently as 1940.

But we must remember that as the problem itself is lessened, the challenge it presents to health workers is intensified. This means that we must evaluate what we are doing in terms of productive action and revise our thinking and procedures to conform to modern concepts.

Administrative Policies

How can nursing programs be adapted to fit this changing pattern of tuberculosis control?

Miss Roberts, nurse officer with the Division of Chronic Disease and Tuberculosis, Public Health Service, presented this paper at the annual meeting of the Philadelphia Tuberculosis Conference, October 31, 1952.

The positive approach to tuberculosis problems calls for enlightened administrative policies. Policies for tuberculosis control must be flexible enough to permit individual evaluation and application to each family situation. They must also change as changes occur in the needs of the patient and the community. They must give practical consideration to the available personnel and facilities to assure beneficial and economical use of all services. This is possible only when plans are made jointly by all those responsible for the various activities of tuberculosis control. For example, some health departments have been able to establish the policy that at least one public health nursing visit be made to the home of every reported new case of active tuberculosis. Such a policy affects many relationships and services of the health agency. Therefore, before a policy is established its need and broad implications must be considered by the health officer, the tuberculosis control officer, and the public health nursing director. They must make certain that the policy conforms to the responsibilities and objectives of the agency, and, simultaneously, they must make plans for it to be carried out.

Many more public health nurses are needed to meet community demands for nursing services in the home. With services for home care and care of the chronically ill expanding, we can expect the demand for nursing services also to increase. This means that policies regulating the discharge of patients from nursing service are as important as those relating to the admission of patients for care. Plans for care must give consideration to the laws of learning

so that the most intensive nursing service is brought to the family at the time the family's desire and need for learning is greatest. Work responsibilities given nursing personnel must be carefully evaluated in order to assure the best use of the education and skills of professional nurses.

Serious shortages in nursing personnel are frequently reported by tuberculosis hospitals. Yet in these hospitals it is not infrequently found that personnel policies lag behind those in the local general hospitals and health agencies, that facilities are inadequate for the protection of hospital personnel, and that the limited amount of professional nursing time is being used in the housekeeping, pharmacy, and dietary departments. Solution of these problems requires intelligent planning at the administrative level.

National organizations and committees have recognized some of the common administrative problems and have made recommendations for their solution. The Tuberculosis Nursing Advisory Service recently published "Cues to Staffing Tuberculosis Units in Hospitals" (3), which should help hospital nursing administrators to evaluate and plan for nursing service to patients. The American Trudeau Society has appointed a committee to study the hazards involved in tuberculosis nursing. We can look for the recommendations of this committee to assist us to make sound plans for the protection of patients and hospital personnel from tuberculosis infections. A subcommittee of the American Public Health Association's Committee on Administrative Practices is developing a guide for the medical and public health nursing supervision of tuberculosis cases and contacts (4), which should assist health departments in selecting tuberculosis families in need of nursing service and in determining the amount of service they need.

These guides are administrative tools which must be adapted to meet local needs and situations, if they are to be used effectively.

Coordination of Services

Included among the community resources which contribute to the effectiveness of nursing

in general, and tuberculosis control are the medical care, social welfare, and rehabilitation facilities. It is important to bring these services into their appropriate supportive relationship with the agencies responsible for tuberculosis control. Through such coordination we can stimulate new interest and more active participation on the part of individuals and agencies unaware of their responsibilities in the tuberculosis control program. And, more important, we can find renewed vigor in attacking this disease. For example, many general hospitals are participating in case-finding activities by X-ray examinations of all clinic and hospital admissions, a group with a high incidence of tuberculosis. Many hospitals which previously refused to admit tuberculosis patients are now taking a more realistic view of their part in tuberculosis control. They are admitting tuberculosis patients and giving them at least immediate care until provisions can be made for long-term care. Also, because the hospitals identify the tuberculosis cases, they can carry out appropriate isolation procedures to prevent the spread of the disease to other patients and to hospital personnel.

In many areas tuberculosis hospitals and health departments are coordinating their efforts so that patient care is becoming an unbroken course from the point of discovery of the disease to complete rehabilitation. To assist in the coordination of services, some health departments employ personnel who work as liaison between the hospital and public health agencies. And some health departments have revised interagency transferral forms to include more comprehensive information about the patient and family so that patient supervision and care can be better integrated.

Nursing Education and Service

Just as good administration and coordination of services are essential to a positive nursing program, so is the provision of nursing consultation. The activities of the tuberculosis nursing consultant may vary considerably but should always include participation in the program planning and in the evaluation of services. She is the technical adviser and therefore should be able to see the many activities of

nursing in their proper perspective to the total control program. Thirty-four States now have tuberculosis nursing consultants, six of whom have extended their consultation services to hospitals as well as to public health agencies (5). In many instances it has been the nursing consultant who has been instrumental in bringing about improved services for patient care, broadened and intensified nursing education in tuberculosis, and improved clinic facilities. She has also helped to resolve inconsistencies in nursing practices in the hospital and in the home.

Our modern tuberculosis control program demands good supervision. In this the nursing supervisor (the public health nursing supervisor or the head nurse in the hospital) makes her important contribution. Her function is to make certain that the program is carried out as planned. She is the middleman between the director and the staff nurse. Through her interpretation of the staff nurse's problems she brings a realistic and practical approach to the director. In her work with the staff she is part educator, administrator, and adviser. Through her, skilled nursing care is provided to the patient and family.

The education of the student and graduate nurse in tuberculosis nursing has often been too limited or lacking. Recognizing that every nurse needs preparation in this field of nursing, schools of nursing are revising their curriculums to meet this need. A report of the Joint Tuberculosis Nursing Advisory Service (6) showed that 39 percent of all schools of nursing are now including tuberculosis nursing in the curriculum. We still have a long way to go. Education is basic to service, and we cannot be satisfied until all schools of nursing include clinical experience in tuberculosis with classroom instruction. This will be possible when more general hospitals accept tuberculosis patients and recognize every patient as an opportunity for student experience; when more tuberculosis hospitals are prepared to offer affiliation programs to schools of nursing; and when more public health agencies are able to accept students for field experience. To make up deficiencies in student nurse education, States have sponsored tuberculosis nursing work conferences and have offered this educational

program to all nurses in the State. These institutes have been sponsored jointly by tuberculosis associations, nursing organizations, and health departments. They not only have contributed to nursing education but have also made it possible for nurses in all areas of work to come together and think through their responsibilities in tuberculosis control.

Finally, it is the staff nurse—in the hospital, the public health agency, the school, the doctor's office, and industry—who gives direct service to the patient, the family, and the community. The effectiveness of the nursing service ultimately rests with her. And she can bring skillful, understanding, complete service to the community in which she works only if she has the security which comes with adequate professional preparation, well-planned supervisory and consultative guidance, and good administrative policies, and only if there are those other facilities and services available in the community which are essential to total patient care. Working within this framework, the staff nurse effectuates a positive approach to tuberculosis nursing.

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Capillary Tube Technique For Serologic Screening Of Syphilis

By CHARLES R. FREEBLE, JR., M.D., M.P.H.,
and BERTTINA ORSBURN, B.S.

THE NEED for a simplified method of obtaining blood specimens has been indicated by field observations in the venereal disease control program of the Ohio Department of Health. Obtaining blood by venipuncture is difficult on infants and small children, is objectionable to many adults, and is not suitable for use in the home. For these reasons we have been searching for a method of collecting capillary blood which would give laboratory results of significance.

A number of methods for the collection of small amounts of blood have been tried in the past, especially in pediatric work. The capillary tube collection method as reported in this paper was described by Davies (1) in 1938, and has been in use for several years in various pediatric hospitals, including Children's Hospital in Columbus, Ohio. It is surprising to us that this technique has not been applied more widely to public health work as it appears to have advantages over venipuncture for mass studies as well as for work with infants and children.

Method of Collection

The tubes used for collection of blood are cut in 8-cm. lengths from strong-walled glass tubing of approximately 2-mm. inside diameter, 4-mm. outside diameter, and 1-mm. wall thickness. These 8-cm. tubes hold approximately 0.4 ml. and can readily be filled two-thirds or three-fourths full by capillary action with blood from finger puncture, or from heel puncture on infants.

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ture on infants. The ends of the tubes are capped with No. 3-68 M. S. rubber vial stoppers which fit snugly on this diameter tubing, seal the tube well, and protect it from breakage if dropped. This length tube fits an ordinary mailing container and can be safely transported to the laboratory in a routine way.

The finger or heel is cleaned with alcohol, wiped dry, and a fairly deep stab made with a Bard-Parker No. 11 blade mounted in a cork. The capillary tube is filled with blood as described by Davies (2), holding the tube horizontally or tipped slightly downward, and allowing the blood to run into the tube by capillary action. It is not difficult to obtain the necessary amount of blood if the finger is wiped completely dry at the beginning, gentle pressure applied to allow the blood to well out in large drops, and the end of the tube touched to the drop of blood. The tube should not be held against the skin of the finger as this tends to let the blood run down the finger. When filled, the tube is capped at both ends with the vial stoppers. The tubes are numbered with 1-inch Scotch "Wetordry" masking tape No. 202 stamped with a Bates numbering machine. This tape does not loosen or come off in the water bath nor do the stamped numbers, when once dried on the tape, run or fade in the water.

Method of Testing

Before the tubes are placed in the centrifuge, blood clots are loosened with a strong wire 6 to 7 inches in length, and the tubes are then centrifuged at 2,000 rpm for 10 minutes. Following centrifugation, the entire specimen is inactivated in a water bath at 60°-62° C. for 3 minutes. It is not necessary to separate the serum from the clot for inactivation, and handling the blood in this manner conserves the serum and saves time in operation. The tubes are divided into lots of 10 in 250-cc. beakers, and the beakers are filled with water from the water bath to a level which covers the serums. The beakers are then placed in the water bath for inactivation. If the vial stoppers on the ends of the tubes are sufficiently tight no water enters even if the water level in the beaker is above the tops of the tubes.

When removed from the water bath, the tubes

Table 1. Comparison of results of capillary VDRL test with Kahn, Kline, and Kolmer tests

Capillary VDRL	Positive and doubtful		Negative		Agreement (percent)	Disagree- ment (percent)
Positive and weakly positive----- Negative-----	Kahn					
	<i>Number</i> 403 8	<i>Percent</i> 64. 7 1. 3	<i>Number</i> 98 113	<i>Percent</i> 15. 8 18. 2	82. 9 -----	17. 1 -----
	Kolmer					
	469 24	75. 4 3. 9	33 96	5. 3 15. 4	90. 8 -----	9. 2 -----
	Kline					
	494 30	79. 5 4. 8	7 91	1. 1 14. 6	94. 1 -----	5. 9 -----

are set out in drilled wooden racks. Divided racks with separated shelves do not work well with these capillary tubes, as the flanges on the vial stoppers tend to catch and pull off when the tubes are put in and taken out of the rack.

Sixteen-gauge glass capillary tubing (approximately 2-mm. outside diameter) in 6-inch lengths, holding 0.2 ml. serum, is used to remove the serum from the collecting tube. With a red wax pencil, a mark is placed 1.5 inches from the end of the tube to measure 0.05 ml. serum for the VDRL test. Some workers consider this length tubing difficult to handle. A shorter length, such as 3 inches, may be used. Sixteen-gauge tubing fits snugly into the smaller opening of a vaccine bulb (for example, bulbs used with smallpox vaccine sets). Using a vaccine bulb, a suction apparatus may be improvised to aid in withdrawing serum from the collection tube. The large opening in the vaccine bulb snugly fits the end of a small glass adapter (7-mm. outside diameter). Attaching a rubber dropper top from an ordinary typing serum bottle to the other end of the adapter completes the apparatus. Other workers have nicknamed this set-up a "squee-gee." With a squee-gee and marked tubing, 0.05 ml. of serum is removed from each sample and placed in a depression of a Boerner micro slide or paraffin ring slide (5).

The antigen is prepared and used as in the standard VDRL technique (4), one drop of antigen from a tuberculin syringe with a 22-gauge needle (1/60 ml.) being added to each serum sample. The plates are then rotated for 4 minutes at 180 rpm on the Boerner rotator. Tests are read as positive, weakly positive, or negative as described in the VDRL technique.

Results

Venous and finger puncture blood specimens were collected simultaneously from 622 patients and employees of the Central Ohio Rapid Treatment Center. Standard Kahn, Kline, Kolmer, and quantitative Kahn tests were done by the laboratory of the Ohio Department of Health on the venous bloods. Capillary VDRL tests on the finger specimens were done at the rapid treatment center.

Of the 622 bloods tested, 397 (63.8 percent) gave positive results with all methods used, 91 (14.6 percent) gave negative results, and 134 (21.6 percent) showed varying disagreement. Table 1 compares the results of the capillary VDRL test with the results obtained from the Kahn, Kline, and Kolmer tests. Best agreement was obtained with the Kline tests.

Complete disagreement occurred in results of tests on 134 serums: The capillary VDRL test

Table 2. Diagnostic status of individuals tested by the capillary VDRL tests and by other methods

Capillary VDRL negative Kline, Kolmer, Kahn, positive		Capillary VDRL positive Kline, Kolmer, Kahn, negative	
Diagnosis	Number of cases	Diagnosis	Number of cases
Early latent, with treatment.....	2	Primary, darkfield positive.....	2
Late latent.....	1	Early latent, with treatment.....	1
Late latent, with treatment.....	3	Late latent, with treatment.....	2
No venereal disease.....	1	Chaneroid.....	1
Total.....	7	Total.....	6

and the other three tests in 13; the Kline in 7; the Kolmer in 6; and the Kahn in 72. On 36 of the 134 specimens, two of the tests were positive and two were negative. Table 2 presents the diagnostic classification of the 13 individuals whose serums when tested by the capillary VDRL were in total disagreement with the other tests.

Five hundred and forty-three (87.3 percent) of the 622 individuals tested were diagnosed syphilitic and 79 (12.7 percent) nonsyphilitic. The capillary VDRL was positive in 499 (91.9 percent) of the 543 diagnosed cases and negative in 77 (97.5 percent) of the 79 nonsyphilitics. Of the 44 syphilitics whose blood was negative to capillary VDRL, 32 were previously treated patients; 9 had primary syphilis; 2 late latent, and 1 central nervous system involvement.

Results of the various tests on the 622 patients and personnel at the Central Ohio Rapid Treatment Center, by syphilitic status, are presented in table 3.

Serums of three individuals among those diagnosed as nonsyphilitic gave positive tests. Two of these had diagnoses of apparent false positive serologic reactions due to recent immunizations. The third had chaneroid, with a further diagnosis of possible primary syphilis, the final diagnosis depending upon further study.

Primary syphilis was the diagnosis in 32 individuals in the series. Of these, 12 were positive and 13 were negative to all tests. Of the seven remaining, six were positive to the capillary VDRL test. Table 4 presents the results of the four test methods on the seven patients having primary syphilis, when test results did not agree completely.

From these results, it appeared that capillary blood collected and tested in the manner described gave results which compared favorably with the results of standard serologic tests on venous blood.

There remained the problems of investigating the suitability of the collection method for mass

Table 3. Comparative results of battery tests, by syphilis status

Result of test	543 diagnosed syphilis								79 diagnosed not syphilis							
	Capillary VDRL		Kahn		Kline		Kolmer		Capillary VDRL		Kahn		Kline		Kolmer	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Positive and weakly positive.....	499	91.9							2	2.5						
Positive and doubtful.....			409	75.3	523	96.3	490	90.2			2	2.5	2	2.5	1	1.3
Negative.....	44	8.1	134	24.7	20	3.7	53	9.8	77	97.5	77	97.5	77	97.5	78	98.7

Table 4. . Comparative results of battery tests on 7 patients with primary syphilis

Capillary VDRL	Kahn	Kline	Kolmer
Weakly positive...	Negative	Doubtful	Negative.
Positive-----	do-----	Negative--	Do.
Do-----	Positive--	Positive--	Do.
Negative-----	Negative--	Doubtful--	Do.
Weakly positive...	do-----	Negative--	Do.
Positive-----	do-----	Positive--	Positive.
Do-----	do-----	do-----	Do.

testing and of determining the time necessary for a person untrained in this technique to develop proficiency in securing specimens.

By arrangement with the Zanesville City Health Department, Zanesville, Ohio, the collection technique was used in a mass survey conducted by that department among students of the two local high schools as a part of their health course. A team consisting of the junior author, two physicians, and two nurses who had never before used the method secured blood specimens from 1,106 students. The inexperienced collectors developed proficiency after collecting approximately 25 specimens and only 3 of the 1,106 specimens were later found unsatisfactory for testing. Six positive and weakly positive results were obtained, and follow-up observations disclosed three previously undiagnosed, untreated students with congenital syphilis, one who had been previously diagnosed and treated, and two with seemingly false positive reactions, who are still under study. Following this, 94 children in a Columbus Children's Home were tested. Their ages ranged from 4 to 12 years, and all tests were negative.

Somewhat more time was required to obtain specimens by capillary tube than by venipuncture, but when the time consumed in preparing

and sterilizing venipuncture equipment was considered, the time differential disappeared.

Discussion

The method of collecting capillary blood specimens described here, which is essentially the same as that reported by Davies in 1938 (1), may be useful in a venereal disease control program. Using the VDRL test, significant results were obtained on 622 specimens when evaluated according to the stage of syphilis in the persons tested. Field experience in which 1,106 specimens were collected demonstrated the technique to be efficient and economical. Experience with 94 children has demonstrated the advantages of this technique over venipuncture.

Summary

1. A method for collecting capillary blood and testing for syphilis has been discussed. The method combines the advantages of collection by finger puncture and adequate laboratory results.

2. It is suggested that the method can become a useful tool in venereal disease control programs, particularly in regard to the screening of infants and children.

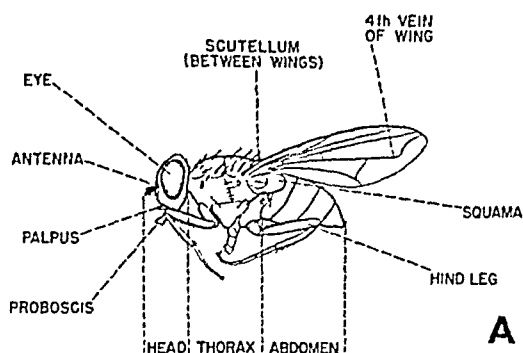
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Identifying Common Flies

By HAROLD R. DODGE, Ph.D.



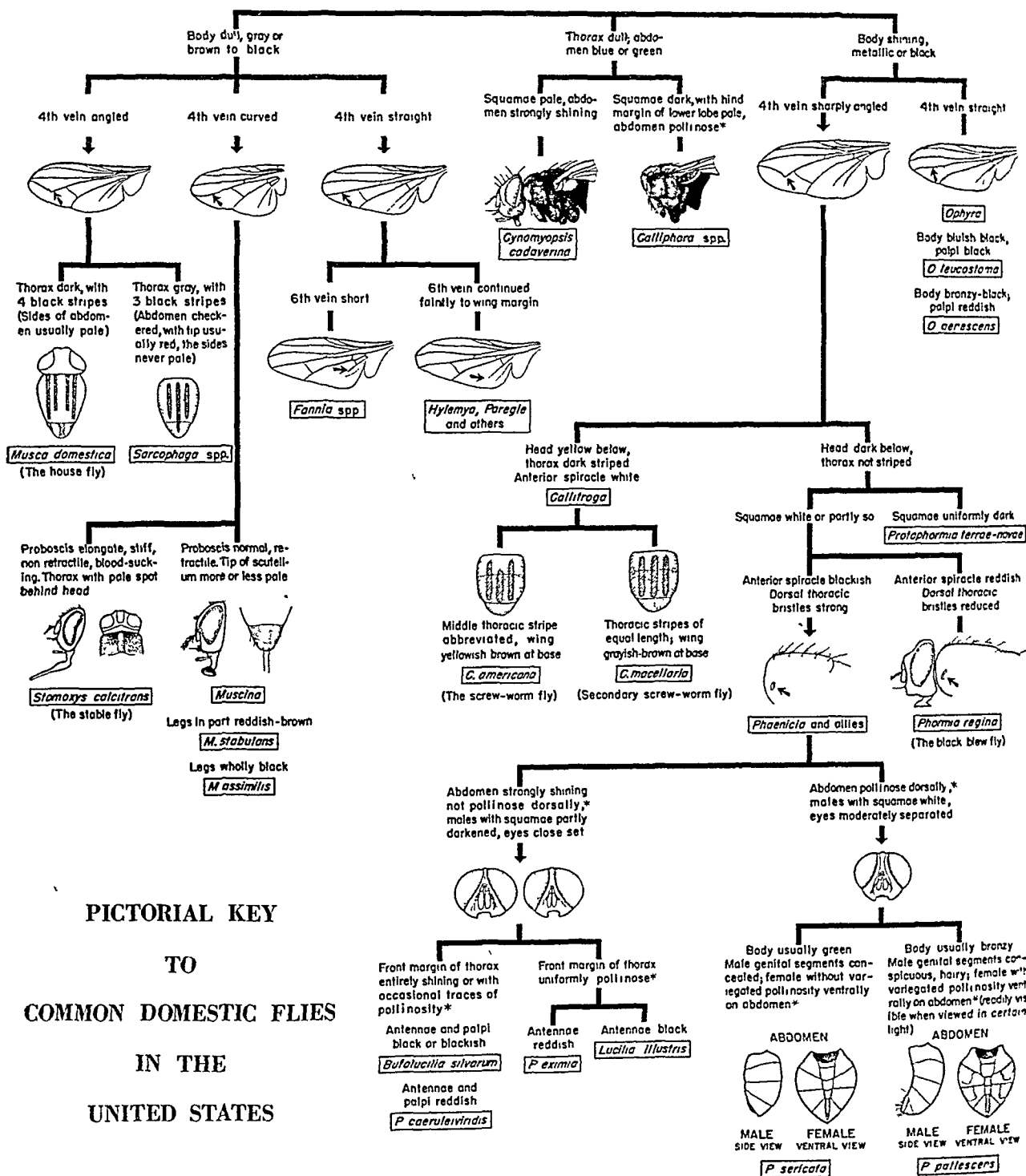
Much of the entomological literature on fly identification is difficult and expensive to obtain. However, the various species of domestic flies in the United States have distinguishing characteristics that workers who lack professional entomological training may learn to recognize. This article is especially designed for the information of personnel engaged in survey and control operations in which large numbers of specimens are involved and the principal objective is measurement of fly densities. Some remarks on zoological terminology and the use of keys are included to aid those not experienced in insect identification. Copies of the two keys on fly identification mentioned in the article and the other available pictorial keys may be obtained by writing the Officer in Charge of the Communicable Disease Center, Public Health Service, Atlanta, Ga.

DURING THE past 6 years, the Communicable Disease Center of the Public Health Service has prepared a series of pictorial keys to facilitate the recognition of insects and other arthropods of medical importance. Two keys have been prepared for the identification of flies. One, the "Pictorial Key to Common Domestic Flies in the U. S.," separates 21 species of common flies, many of which are widely distributed in other parts of the world. The other, the "Pictorial Key to Principal Families of Diptera of Public Health Importance," separates 24 families of Diptera (two-winged insects including such common types as flies, mosquitoes, gnats, and midges).

Dr. Dodge, an entomologist with the Communicable Disease Center of the Public Health Service, is engaged in research work on flies.

This technical key, however, is not essential for the recognition of many common species of domestic flies.

In scientific practice, each kind of organism is given two names. For example, the common housefly is called "*Musca domestica*." *Musca* is the generic name and *domestica* the specific name. Generic names are always capitalized; specific names are not; both are italicized. Sometimes, when the generic name is mentioned previously, it is abbreviated to the first letter followed by a period, for example, *M. domestica*. In the accompanying pictorial key, some of the generic names are followed by "spp." An example is *Sarcophaga* spp. This means that more than one species occurs within the genus *Sarcophaga* but that the key does not separate the species. Often the name or an abbreviation of the name of the person who described the species is given after the specific name. For



example, the name of the common housefly may be followed by the name "Linnaeus," sometimes abbreviated Linn. or L.

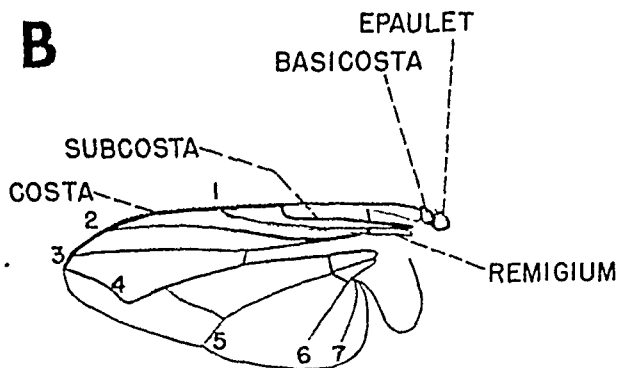
A family constitutes a group of related genera. For example, the family "Muscidae" includes *Musca*, *Muscina*, *Ophyra*, *Stomoxys*, and related genera. Sometimes unrelated genera superficially resemble each other closely. On the other hand, members within one family may be quite diverse in general appearance. Thus, it is much simpler to recognize the housefly than to recognize its family characteristics. In fly control operations, the family name of a fly is of secondary importance; therefore, only the material in the "Pictorial Key to Common Domestic Flies in the U. S." is presented here.

Use of the Key

Identification keys are merely guides used to distinguish between closely related species. The most common type of key consists of a series of choices or "couplets," each containing two or more alternatives; each alternative refers the user to a succeeding couplet until the specimen under consideration is keyed or "run out" to a certain identity or name. In pictorial keys, most or all of the characteristics used in the couplets are illustrated.

In using the pictorial key shown, the general coloration of the body must first be determined. The housefly, for example, belongs in the gray-bodied group at the left. Three subdivisions of this group are based on the structure of the fourth wing vein. It can be observed even by the naked eye that this vein, which in many species ends behind the wing tip, is abruptly angled (not gradually curved) and ends before the wing tip, close to the end of the third wing vein. The presence of four dark stripes on the thorax and the usual yellowish coloration of the abdomen sets it apart from the various species of *Sarcophaga*.

Identifying another common fly, *Phaenicia sericata*, is not as simple. The uniformly greenish-colored body refers it to the group of species on the right side of the key. It will not be difficult to observe that the fourth vein is again abruptly angled or that the thorax is without obvious dark stripes, so it readily keys

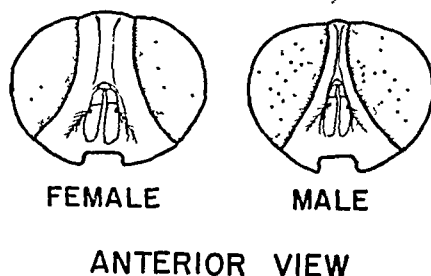


NO'S 1-7 ARE THE "LONGITUDINAL WING VEINS" USUALLY REFERRED TO AS "VEINS"

past *Ophyra* and *Callitroga*. But its separation from the remaining genera and species is rather difficult. The whitish squamae (see fig. A of whole fly for location of this structure) and lack of a reddish spot on the side of the thorax (see arrow in key illustration) will put it with "*Phaenicia* and allies." The dorsal pollen of the abdomen gives it a duller color than the very bright, shining abdomen of most species of this group, but if the specimen is of the male sex, in which the pollen is less evident, it is useful to check the color of the squamae and the width of the interocular space (see illustration at this point in the key and fig. C). *Phaenicia sericata* can be separated from the remaining species, *Phaenicia pallescens*, by its usual greenish color and the other characteristics shown in the key.

As familiarity with the various flies increases there will be less and less need to refer to the key. The observer may even notice that some flies have prominent differences not mentioned in the key. For example, *Phaenicia* and allies

USUAL DIFFERENCE IN INTEROCULAR SPACE OF MALE AND FEMALE FLIES



C

are brighter colored than *Phormia* and *Protophormia*. In a key of this type, it is, of course, impossible to give all the outstanding characteristics. Some additional information on the various species follows. But it is advisable during the initial identification work to send representative determined specimens of all species to a specialist for confirmation.

Features of Common Species

Calliphora spp. and the allied species, *Alldrichina grahami*, a native of Asia now well established in California and Arizona, and *Eucaliphora lilaea*, a common western species that is rare in the East, are quite easily recognized by the narrow, crescent-shaped, white margin of the lower squamal lobe. The identification of most species in this group is difficult, but two common species can be recognized as follows: *Calliphora vicina* (formerly called *erythrocephala*) has cheeks which are mainly reddish, and it has a reddish anterior thoracic spiracle; *Calliphora vomitoria* has a "beard" of reddish-yellow hairs on the lower hind margin of the head. The species of the *Calliphora* complex are common in the Northern Hemisphere in the spring and fall. In the southern States they occur chiefly in the winter months. They breed primarily in dead animal matter.

Callitroga americana and *Callitroga macellaria* range from Argentina to northern United States. They are very similar in general appearance but differ in habits. *C. macellaria* is a common fly over the greater portion of its range. It is readily attracted to traps and breeds in dead animal matter. *C. americana*, the "screw-worm" fly, is a primary parasite of mammals; its larvae occur in wounds and natural body orifices. Generally, it is larger in size than *C. macellaria* and the legs are usually nearly black. *Paralucilia wheeleri* is a western species which strongly resembles the two species of *Callitroga*, but it is distinguished from them by its dark brown squamae and longer palpi.

Cynomyopsis cadaverina is a common northern species allied to *Calliphora* and similar to that genus in habits and seasonal distribution. It is easily recognized through the nearly uniform white squamae which contrast sharply with the dark body, and by the more strongly

shining abdomen which in both sexes is more pointed.

Fannia spp. are moderately small, grayish or brownish flies, sometimes marked with yellow. Certain species are black and shining, but they never approach the highly polished black of *Ophyra*. *Fannia canicularis* is commonly known as the "little housefly" and *Fannia scalaris* as the "latrine fly." The sixth wing vein of *Fannia* is short and the seventh is sufficiently curved so that the two would, if continued, intersect before they reach the wing margin. *F. canicularis* and *F. scalaris* are nearly cosmopolitan in distribution, breeding in moist material of plant or animal origin.

Hylemya cilicrura and *Paregle cinerella* are two common examples of the Anthomyiinae, a subfamily characterized by the continuation of the sixth vein, though faintly, to the wing margin, and by the presence of fine, erect hairs subapically on the under side of the scutellum. In *H. cilicrura* the female has a characteristic reddish spot above the base of the antennae, and in the male the abdomen, viewed laterally, is quite flat. In *P. cinerella* the head usually is entirely black, and the male abdomen is not greatly flattened. Both species breed in vegetable matter, and they and allied species are sometimes important pests of crops. They are widely distributed in the United States.

M. domestica, the "housefly," is easily recognized by the characteristics mentioned in the key, and there are few other American flies which might be confused with it. These are, primarily, *F. canicularis*, *Stomoxys calcitrans*, and *Muscina*. In other parts of the world there are many species of the genus *Musca*. *M. domestica* breeds in garbage, vegetable matter, or excrement of herbivorous animals, and is widely distributed throughout the world.

Muscina stabulans, the "false stablefly" and *Muscina assimilis* are widely distributed species, both probably originating in the Old World. They are well-marked species, somewhat larger than the housefly, and have a moderately curved fourth vein. They breed primarily in plant and animal wastes where their larvae may prey upon other fly larvae. Two allied, larger species are relatively new to North America, *Muscina pascuorum* and *Muscina pabulorum*. They are distinguished from *M. assimilis*, which they

otherwise resemble, by their larger size, the reddish palpi (not black), and by the strongly curved fourth vein, ending in or before the wing tip.

Ophyra aenescens and *Ophyra leucostoma* are easily recognized by the highly polished, shining black body. *O. aenescens* is bronzy-black with yellowish squamae, while *O. leucostoma* is bluish black with dark squamae. The difference in body color between these two species, though slight, is remarkably constant. Both species are widely distributed in the United States; they apparently prefer to breed in animal matter.

Phaenicia and the related species, *Lucilia illustris* and *Bufolucilia silvarum*, are quite difficult for the beginner to separate. *Phaenicia sericata*, the most common species, is variable in body color, ranging from its usual green to bluish, and occasional specimens have a reddish, "coppery" luster. Together with its closest ally, *Phaenicia pallescens*, it may be distinguished from the remaining species by a whitish pollinosity on the upper surface of the abdomen, especially in the females, and by the separation of the male eyes by a distance equal to or greater than one-tenth the width of the head. *P. pallescens* is a smaller species with body usually bronzy colored, sometimes with greenish luster but never coppery red. It is common in the southern States and is a close relative of *Phaenicia cuprina*, an important pest in Australia and Africa. Both *P. sericata* and *P. pallescens* are primarily urban species, being common in market districts and city dumps.

Phaenicia caeruleiviridis, *Phaenicia eximia*, *Lucilia illustris*, and *Bufolucilia silvarum* agree in that the abdomen is highly shining dorsally, and the eyes of the male are separated by a distance less than one-tenth the width of the head. These species all breed in dead animal matter, except possibly *Bufolucilia*, which is known to be a parasite of frogs and toads. *P. caeruleiviridis* and *P. eximia*, in contrast to *P. sericata* and *P. pallescens*, are mainly "rural" in their habits, seldom being encountered in city business districts or city dumps. However, they frequently may be taken in residential areas. *P. caeruleiviridis* is widespread east of the Rocky Mountains; *P. eximia* is a neotropical species which occurs in Texas and Louisi-

ana; *L. illustris* and *B. silvarum* are widely distributed in the northern and western States.

Phormia regina and *Protophormia terrae-novae* should be recognized without difficulty through their key characteristics. Both species breed in animal matter and occur primarily during the cooler months of spring and fall, or, in the southern limits of their range, in the winter. *P. regina* is deceptively called the "black blowfly," for its body is not black. Both species are of darker coloration than the various species of the *Phaenicia* complex. *P. regina* is usually dark green; *P. terrae-novae* is usually dark blue. Both species are widespread in the Northern Hemisphere. *P. regina* is the more common species, being absent or rare only in the southernmost parts of the United States.

Sarcophaga spp. includes a large group of genera and species of the family Sarcophagidae. These flies vary from three-sixteenths to more than 1 inch in length, and with few exceptions have three dark stripes dorsally on a grayish thorax. Some tropical species are bright yellow with black markings, or even metallic blue or green. The abdomen typically has a "checkered" pollinose pattern of changeable light and dark areas, with genital segments usually reddish but sometimes black. Female sarcophagids deposit living young.

Stomoxys calcitrans, variously called the "stablefly," or "dogfly," or "biting housefly," is a common and very widespread pest of livestock and will bite man freely. It breeds in excrement of herbivores, or in accumulations of vegetable wastes such as piles of grass clippings or seaweed. The elongated, stiff proboscis is characteristic of this species. In repose it projects for a considerable distance in front of the head. In size and general coloration, *Stomoxys* resembles the housefly but is further distinguished from that species by the moderately bent fourth wing vein and by the whitish pollinose spot on the front margin of the thorax.

Two other genera not represented in the key rate mention. *Pollenia rudis* frequently enters houses or attics in large numbers in the fall; for this reason it is called the "clusterfly." Although it keys to *Musca* and *Sarcophaga*, it differs from these flies in having a thorax that is not striped but is partly clothed with crinkly

yellowish hairs, particularly on the sides. The larvae of this species are parasitic on earthworms.

Scopeuma spp. are dung breeding flies which occasionally are common, and which are characterized by dense yellowish hairs and by the slender body. They would key out with *Hylemya*. They occur during the cool months of the year from the Arctic to the southern States.

At times certain other species of flies may appear to be common. It is impossible with limited space to deal with all species which may be encountered, but the species considered here constitute the bulk of the flies commonly associated with man in North America.

NOTE: The writer is extremely interested in the study of *Sarcophaga* flies, and will welcome material from any source. Many of the parasitic species are rarely taken in fly traps, but are more likely to be collected by rearing from host or by general collecting. Some known hosts are grasshoppers, mantids, snails, wasps, bees, caterpillars, spiders or their egg masses, and beetles. Many species breed in carrion or excre-

ment. If flies are obtained by rearing from larvae, the pupal shells should be pinned with the flies, and the host, in the case of parasitic species, should be preserved. Males of some rare species may be found sunning themselves upon rocks or barren ground on hilltops.

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Regional Congenital Heart Program

The fourth regional program to help provide surgical and hospital care for children with congenital heart disease will be located at Johns Hopkins Hospital, Baltimore, where more than 1,200 "blue babies" have been operated on since 1945.

For the past 4 years, the Maryland State Department of Health has administered a small fund for congenital heart surgery for out-of-state children. Inclusion of the State in the regional program will extend and supplement this service to benefit children from the Middle Atlantic and Southern States. In special cases, children may be referred from other parts of the country if the care they need is available only at Johns Hopkins. Full geographic coverage for the country is planned upon completion of the regional heart center program.

Local funds, both public and private, in the State where the child resides, will be used for the major share of the costs. A special grant of the Children's Bureau, Federal Security Agency, may be used when such resources are not available. The grant will also provide convalescent sanatorium care and in-patient hospital care including special nursing and blood transfusions.

Regional programs previously approved are in New Haven, Conn., Chicago, Ill., and in San Francisco and Los Angeles, Calif.

Reported Tuberculosis Morbidity, January-June 1952

Provisional reports from the State health departments indicate there were approximately 56,000 cases of tuberculosis newly reported in the United States during the first 6 months of 1952. This is a slight decline from the numbers reported in the corresponding periods of 1950 and 1951. On the basis of these prelim-

inary data, it is estimated that some 6,000 fewer cases will be reported during the year 1952 than were reported in 1951.

A portion of the decline was due to the application of new case-reporting procedures in 1952. The new procedures limited the kinds of tuberculosis cases which should be reported,

New tuberculosis cases reported, United States and Territories, January-June, 1952

State or Territory	Total newly reported tuberculosis cases	Newly reported group A (active and probably active) tuberculosis cases		State or Territory	Total newly reported tuberculosis cases	Newly reported group A (active and probably active) tuberculosis cases	
		Number	Annual rate per 100,000 population ¹			Number	Annual rate per 100,000 population ¹
Alabama	1, 287	675	44. 4	New Mexico	570	328	93. 2
Arizona	1, 852	788	195. 8	New York	6, 162	5, 999	79. 8
Arkansas	884	795	83. 2	North Carolina	1, 106	875	42. 3
California	4, 423	4, 423	80. 2	North Dakota	92	86	28. 4
Colorado	622	242	35. 2	Ohio	3, 284	2, 452	60. 8
Connecticut	725	490	48. 1	Oklahoma	698	501	44. 2
Delaware	79	56	34. 0	Oregon	976	441	56. 6
District of Columbia	946	569	140. 3	Pennsylvania	2, 732	(²)	-----
Florida	1, 285	727	49. 1	Rhode Island	216	172	43. 4
Georgia	1, 024	819	47. 0	South Carolina	677	524	49. 3
Idaho	115	89	30. 2	South Dakota	87	52	16. 1
Illinois	2, 333	2, 333	52. 9	Tennessee	1, 867	918	55. 3
Indiana	823	727	36. 0	Texas	2, 258	(²)	-----
Iowa	348	173	13. 2	Utah	74	74	20. 9
Kansas	254	247	25. 3	Vermont	200	82	44. 0
Kentucky	1, 270	1, 134	77. 6	Virginia	2, 471	(²)	-----
Louisiana	1, 082	(²)	-----	Washington	(²)	(²)	-----
Maine	195	177	39. 7	West Virginia	541	510	51. 1
Maryland	1, 414	1, 243	101. 8	Wisconsin	714	665	38. 3
Massachusetts	1, 215	1, 121	47. 4	Wyoming	50	22	14. 9
Michigan	3, 075	2, 013	61. 5	State total ³	56, 341	43, 777	57. 1
Minnesota	1, 072	433	28. 9	Alaska	253	211	310. 3
Mississippi	599	537	49. 0	Hawaii	304	143	57. 5
Missouri	1, 098	1, 015	50. 2	Puerto Rico	3, 032	2, 668	240. 8
Montana	175	127	43. 1	United States and Territories ³	59, 930	46, 799	59. 9
Nebraska	135	129	19. 1				
Nevada	72	63	73. 7				
New Hampshire	116	96	36. 0				
New Jersey	2, 025	1, 285	51. 7				

¹ Annual rate, based on population as of July 1, 1951, for States; as of July 1, 1950, for Territories.

² Not reported.

³ Including estimates for States not reporting.

SOURCE: Semiannual tuberculosis morbidity reports (provisional).

and in addition, provided that active and probably active cases should be counted separately from all other cases of tuberculosis.

In accordance with the recommendations of the State directors of tuberculosis control (*Public Health Reports*, October 5, 1951, pp. 1291-1294), State health departments report their new cases in two categories: group A—active and probably active cases; and group B—other reportable cases. This recommended reporting procedure was designed to achieve comparability of data on newly reported cases from State to State and to measure the problem better by identifying presumably infectious cases of tuberculosis needing treatment.

Of the 56,000 new cases reported from January through June 1952, 44,000 were designated as active or probably active cases—an estimated annual reporting rate of 57 per 100,000 population for the continental United States.

The tuberculosis morbidity rate continues to be high in spite of the rapid decline in mortality. This fact lends considerable importance to the numbers of cases newly reported each

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year as an index of the tuberculosis problem in the United States.

Shown in the accompanying table are total cases and group A (active and probably active) cases reported by each State and Territory. An improvement in comparability of data from State to State by the separate reporting of active and probably active cases is readily apparent. Total cases reported by some States (the only figures available in previous years) include only active and probably active cases, whereas totals reported by other States and Territories include cases of more limited clinical significance. As reporting improves, the annual reporting rate of active and probably active tuberculosis cases will no doubt become one of our best measures of the true tuberculosis problem in the various States and Territories.

1950 Census of Mental Patients

According to preliminary information, the number of patients in State and county mental hospitals increased in 1950. At the end of that year, about 600,000 were under supervision in 201 State and 112 county mental hospitals. This compares with more than 580,000 in the previous year. The average rate of all first admissions was 97.3 per 100,000 estimated civilian population.

Based on data compiled from an annual census by the National Institute of Mental Health, Public Health Service, these figures are reported in "Patients in Public Hospitals for the Prolonged Care of the Mentally Ill, 1950."

The National Institute of Mental Health points out that the increase may involve such factors other than an increase in the incidence or prevalence of mental illness as these: growth of the general population, increase in facilities for mental patients, earlier admission of patients through improved diagnostic methods, and hospitalization of patients who were previously untreated.

Industrial Sickness

Absenteeism

Rates for Specific Causes in 1951 and half of 1952

Men and Women 1951

The 1951 rate for sickness and nonindustrial injuries among men (131.2) is 12 percent above the 1950 rate (116.8) and 9 percent above the 10-year mean (120.7). With the exception of the influenza and grippe rate, 1951 rates for specific causes do not differ notably from 1950 rates (see table 1). But 1951 rates for four causes are more than 30 percent above their 10-year means. Cancer is 57 percent above; other diseases of genitourinary system, 41 percent; infectious and parasitic diseases, 37 percent; and hernia, 31 percent. Frequency rates for these are all relatively low, varying from 0.7 for cancer for 1942-51 to 4.8 for other diseases of the genitourinary system for 1951.

The 1951 over-all rate among women (315.1) is 22 percent above the 1950 rate (258.4) and 29 percent above the 10-year mean (244.5). With only a few exceptions, the 1951 rates for specific causes are either approximate to or higher than the corresponding 1950 and 1942-51 rates. Note the increase in rates for influenza and grippe, pneumonia, neurasthenia and the like, and other diseases of genitourinary system.

1942-51

Among men, rates for nonindustrial injuries and the digestive group of diseases were highest in 1951, respectively, 27 and 20 percent above their 10-year means. Among women, 1951 showed the highest rates for all causes, for the respiratory group, and for the nonrespiratory-nondigestive group of diseases. In terms of

the 10-year means, the percentage excesses are 29, 35, and 30 percent, respectively.

Frequency by Duration

Frequency rates, shown in table 2, reveal that the rate for women is about twice the rate for men except for absences lasting more than 6 months. Table 2 is derived from the experience of 10 of the reporting organizations which pay benefits for 26 or 52 weeks.

Among both men and women, approximately four-fifths of the respiratory absences and one-half of the nonrespiratory absences lasted less than 1 month. Nonrespiratory diseases accounted for 80 percent of all absences lasting 57 days or longer (30.1 per 1,000 men, and 59.7 per 1,000 women). Twenty percent of the absences were caused by respiratory diseases and nonindustrial injuries combined. During 1951, 7 of every 1,000 men workers and 9 of every 1,000 women workers had an illness lasting more than 6 months. Ten men and 22 women of each 1,000 had an illness lasting from 3 to 6 months.

Days of Disability

Relatively small differences are found in the corresponding disability rates among men dur-

W. M. Gafafer, D.Sc., continues the quarterly and annual reports on industrial morbidity published in May and September 1952 and in earlier issues. Dr. Gafafer is in charge of the statistical services of the Division of Occupational Health, Bureau of State Services, Public Health Service.

Table 1. Absences per 1,000 persons by cause—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—1951, 1950, and 1942–51¹

Cause ²	Number of absences per 1,000 persons beginning in specified period					
	Males			Females		
	1951	1942–51 ³	1950	1951	1942–51 ³	1950
Sickness and nonindustrial injuries.....	131.2	120.7	116.8	315.1	244.5	258.4
Percent of female rate.....	42	49	45	240	203	221
Percent of male rate.....						
Nonindustrial injuries (169–195).....	15.9	12.5	13.7	19.2	16.8	19.3
Sickness.....	115.3	108.2	103.1	295.9	227.7	239.1
Respiratory diseases.....	41.7	43.3	34.1	136.7	101.1	106.1
Tuberculosis of respiratory system (13).....	.6	.7	.5	.5	.5	.2
Influenza, grippe (33).....	16.1	16.7	10.9	52.7	34.3	30.7
Bronchitis, acute and chronic (106).....	6.2	7.0	5.9	11.1	11.1	11.6
Pneumonia, all forms (107–109).....	5.8	5.3	5.4	7.7	4.2	5.4
Diseases of pharynx and tonsils (115b, 115c).....	3.6	4.6	3.2	14.8	16.0	13.1
Other respiratory diseases (104, 105, 110–114).....	9.4	9.0	8.2	49.9	35.0	45.1
Digestive diseases.....	22.3	18.6	20.1	34.6	31.1	28.5
Diseases of stomach except cancer (117, 118).....	7.0	5.9	6.2	4.5	3.6	3.7
Diarrhea and enteritis (120).....	2.9	2.4	2.6	9.6	6.4	7.3
Appendicitis (121).....	4.5	4.1	4.1	9.4	11.7	7.2
Hernia (122a).....	3.4	2.6	3.1	.2	.6	1.0
Other digestive diseases (115a, 115d, 116, 122b–129).....	4.5	3.6	4.1	10.9	8.8	9.3
Nonrespiratory-nondigestive diseases.....	48.1	42.7	45.3	117.6	90.4	100.4
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) ⁴	3.7	2.7	3.0	13.6	7.0	9.8
Cancer, all sites (45–55).....	1.1	.7	1.1	.9	.6	1.1
Rheumatism, acute and chronic (58, 59).....	3.5	4.5	3.6	4.4	4.4	4.5
Neurasthenia and the like (part of 84d).....	1.7	1.9	1.5	16.1	12.3	12.2
Neuralgia, neuritis, sciatica (87b).....	2.2	2.6	2.1	2.8	2.9	3.3
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b).....	2.1	1.8	2.3	3.4	2.1	3.7
Diseases of heart (90–95).....	5.3	4.4	5.4	1.8	2.3	2.3
Diseases of arteries and high blood pressure (96–99, 102).....	2.3	2.1	2.3	1.5	1.4	1.6
Other diseases of circulatory system (100, 101, 103).....	4.9	4.2	4.8	7.2	6.0	6.7
Nephritis, acute and chronic (130–132).....	.4	.4	.4	.4	.4	.3
Other diseases of genitourinary system (133–139).....	4.8	3.4	4.2	30.5	21.0	23.5
Diseases of skin (151–153).....	3.6	3.5	3.6	4.9	5.5	5.3
Diseases of organs of movement except diseases of joints (156b).....	3.6	3.5	3.5	9.7	6.2	7.4
All other diseases (56, 57, 60–79, 88, 89, 154, 155, 156a, 157, 162).....	8.9	7.0	7.5	20.4	18.3	18.7
Ill-defined and unknown causes (200).....	3.2	3.6	3.6	7.0	5.1	4.1
Average number of persons.....	173, 853	2, 301, 041	173, 881	15, 154	212, 413	14, 113

¹ Industrial injuries and venereal diseases are not included. ² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939. ³ Average of the 10 annual rates. ⁴ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

Table 2. Absences¹ per 1,000 persons by duration—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—1951

Duration of absence in calendar days	Sickness and nonindustrial injuries ²		Nonindustrial injuries		Respiratory diseases		Nonrespiratory diseases ³	
	Males	Females	Males	Females	Males	Females	Males	Females
Number of absences per 1,000 persons								
8 days or longer.....	146.7	302.2	14.8	19.0	49.8	125.8	82.1	157.4
8-28 days.....	86.9	176.6	8.3	9.7	40.6	99.2	38.0	67.7
29-56 days.....	29.7	65.9	3.3	5.0	5.7	18.3	20.7	42.6
57-91 days.....	13.1	29.1	1.7	1.9	1.7	6.0	9.7	21.2
92-183 days.....	10.0	21.9	1.2	1.7	.9	1.5	7.9	18.7
184 days or longer.....	7.0	8.7	.3	.7	.9	.8	5.8	7.2
Number of absences per 1,000 persons (cumulative)								
8 days or longer.....	146.7	302.2	14.8	19.0	49.8	125.8	82.1	157.4
29 days or longer.....	59.8	125.6	6.5	9.3	9.2	26.6	44.1	89.7
57 days or longer.....	30.1	59.7	3.2	4.3	3.5	8.3	23.4	47.1
92 days or longer.....	17.0	30.6	1.5	2.4	1.8	2.3	13.7	25.9
184 days or longer.....	7.0	8.7	.3	.7	.9	.8	5.8	7.2

¹ Data from 10 reporting organizations paying benefits for 26 or 52 weeks. ² Industrial injuries and venereal diseases are not included. ³ Digestive diseases, nonrespiratory-nondigestive diseases and ill-defined and unknown causes are included. Average number of persons: males, 55,853; females, 12,831.

ing 1951 and 1950 (table 3). Table 3 is based on the same population as table 2. In each year, nonrespiratory-nondigestive diseases accounted for one-half of the days of disability per man. Respiratory diseases and digestive diseases each accounted for about the same number of days of disability.

In 1951, women averaged 11.9 days of disability. Compare this with 9.8 in 1950. The excess is explained by an increase in both the frequency and the severity of nonrespiratory-nondigestive diseases (103.8 to 124.6 absences per 1,000, and 48.7 to 53.5 days per absence). If time lost from absences lasting less than 8 days were included, the number of disability days would have increased to approximately 13 per woman and 9 per man.

Men Jan-June 1952

Sickness absenteeism among men workers during the first half of 1952 (table 4) was about the same as in the corresponding 1951 period. In both years, the first quarter rates (170.9 and 168.8) are approximately 40 percent above the corresponding second quarter rates (120.9 and 121.5). Respiratory diseases account for the higher rates in the first quarter.

Note the similarity of the 1952 and 1951 second quarter rates for specific causes. Likewise, the 1952 first quarter rates for specific causes differ little from the 1951 corresponding rates with the exception of influenza and grippe.

NOTE: Data are derived from periodic reports of industrial sick benefit organizations and are limited to sickness and nonindustrial injuries causing absence from work for more than 1 week.

The 1950 annual report on men and women workers and an index of the reports from 1920-50 appeared in *Public Health Reports*, November 23, 1951, pp. 1550-1552.

Table 3. Summary of disability data ¹—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—1951, and 1950

Cause ²	Males		Females	
	1951	1950	1951	1950
Number of days of disability per person				
Sickness and nonindustrial injuries.....	6.4	6.1	11.9	9.8
Nonindustrial injuries.....	.6	.6	.9	.9
Respiratory diseases.....	1.3	1.1	2.9	2.5
Digestive diseases.....	1.2	1.2	1.4	1.4
Nonrespiratory-nondigestive diseases.....	3.3	3.2	6.7	5.0
Number of days of disability per absence				
Sickness and nonindustrial injuries.....	43.7	45.3	39.4	38.0
Nonindustrial injuries.....	41.9	45.4	45.6	46.2
Respiratory diseases.....	25.5	25.6	23.4	23.3
Digestive diseases.....	47.5	49.2	44.1	48.5
Nonrespiratory-nondigestive diseases.....	58.3	58.4	53.5	48.7
Number of absences per 1,000 persons				
Sickness and nonindustrial injuries.....	146.7	133.7	302.2	258.9
Nonindustrial injuries.....	14.8	13.7	19.0	19.9
Respiratory diseases.....	49.8	41.2	125.8	106.7
Digestive diseases.....	25.0	23.5	32.8	28.5
Nonrespiratory-nondigestive diseases.....	57.1	55.3	124.6	103.8
Average number of persons.....	55,853	51,327	12,831	10,513

¹ Data from 10 reporting organizations paying benefits for 26 or 52 weeks.

² Industrial injuries and venereal diseases are not included. Ill-defined and unknown causes are included in the nonrespiratory-nondigestive diseases.

Table 4. Absences per 1,000 males by cause (annual basis)—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—first and second quarters, 1952 ¹

Cause ²	Number of absences per 1,000 males beginning in specified period						
	Second quarter		First quarter		First half		
	1952	1951	1952	1951	1952	1951	1947-51
Sickness and nonindustrial injuries.....	120.9	121.5	170.9	168.8	146.0	144.8	122.0
Nonindustrial injuries (169-195).....	14.5	14.8	16.9	15.4	15.7	15.1	12.6
Sickness.....	106.4	106.7	154.0	153.4	130.3	129.7	109.4
Respiratory diseases.....	33.6	33.7	67.1	78.3	50.5	55.6	43.5
Tuberculosis of respiratory system (13).....	.6	.6	.8	.9	.7	.7	.7
Influenza, grippe (33).....	10.5	12.1	26.0	39.6	18.3	25.6	17.4
Bronchitis, acute and chronic (106).....	4.3	4.4	9.5	10.1	6.9	7.2	6.6
Pneumonia, all forms (107-109).....	4.9	5.0	8.6	10.5	6.8	7.7	5.7
Diseases of pharynx and tonsils (115b, 115c).....	4.4	3.9	5.3	4.2	4.8	4.1	4.0
Other respiratory diseases (104, 105, 110-114).....	8.9	7.7	16.9	13.0	13.0	10.3	9.1

See footnotes at end of table.

Table 4. Absences per 1,000 males by cause (annual basis)—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—first and second quarters, 1952¹—Continued

Cause ²	Number of absences per 1,000 males beginning in specified period						
	Second quarter		First quarter		First half		
	1952	1951	1952	1951	1952	1951	1947-51
Digestive diseases.....	22.0	22.2	26.1	21.8	24.1	22.0	18.7
Diseases of stomach except cancer (117, 118).....	6.4	6.9	7.8	6.9	7.1	6.9	5.9
Diarrhea and enteritis (120).....	3.1	2.4	3.6	2.9	3.4	2.6	2.3
Appendicitis (121).....	4.1	4.8	4.3	4.6	4.2	4.7	3.9
Hernia (122a).....	3.5	3.5	4.8	3.0	4.2	3.3	2.8
Other digestive diseases (115a, 115d, 116, 122b-129).....	4.9	4.6	5.6	4.4	5.2	4.5	3.8
Nonrespiratory-nondigestive diseases.....	48.4	47.5	57.5	50.0	52.9	48.8	43.7
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) ³	4.2	3.4	6.9	5.3	5.5	4.3	3.3
Rheumatism, acute and chronic (58, 59).....	3.9	3.3	3.9	4.3	3.9	3.8	4.3
Neurasthenia and the like (part of 84d).....	1.7	1.8	1.8	1.2	1.7	1.5	1.7
Neuralgia, neuritis, sciatica (87b).....	1.9	2.2	2.3	2.2	2.1	2.2	2.4
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	2.0	2.1	2.4	2.2	2.2	2.2	1.9
Diseases of heart, arteries, high blood pressure, and nephritis (90-99, 102, 130-132).....	6.8	8.1	9.1	9.2	7.9	8.6	7.8
Other diseases of genitourinary system (133-138).....	5.0	4.9	5.8	4.9	5.4	4.9	3.7
Diseases of skin (151-153).....	4.1	3.4	4.1	3.4	4.1	3.4	3.2
Diseases of organs of movement except diseases of joints (156b).....	3.6	3.2	4.3	3.6	4.0	3.4	3.1
All other diseases (45-57, 60-79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162).....	15.2	15.1	16.9	13.7	16.1	14.5	12.3
Ill-defined and unknown causes (200).....	2.4	3.3	3.3	3.3	2.8	3.3	3.5
Average number of males.....	169,435	169,965	171,363	166,670	170,399	168,317	917,010

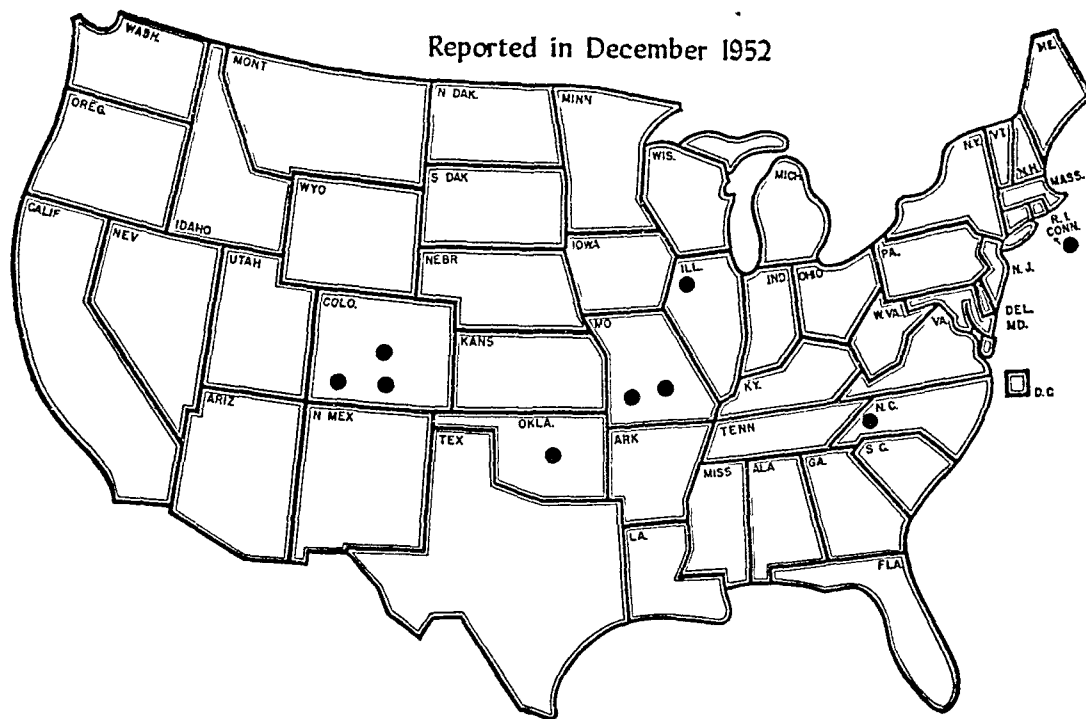
¹ Industrial injuries and venereal diseases are not included. ² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939. ³ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

World Health Day

The fifth annual observance of World Health Day will occur on April 7.

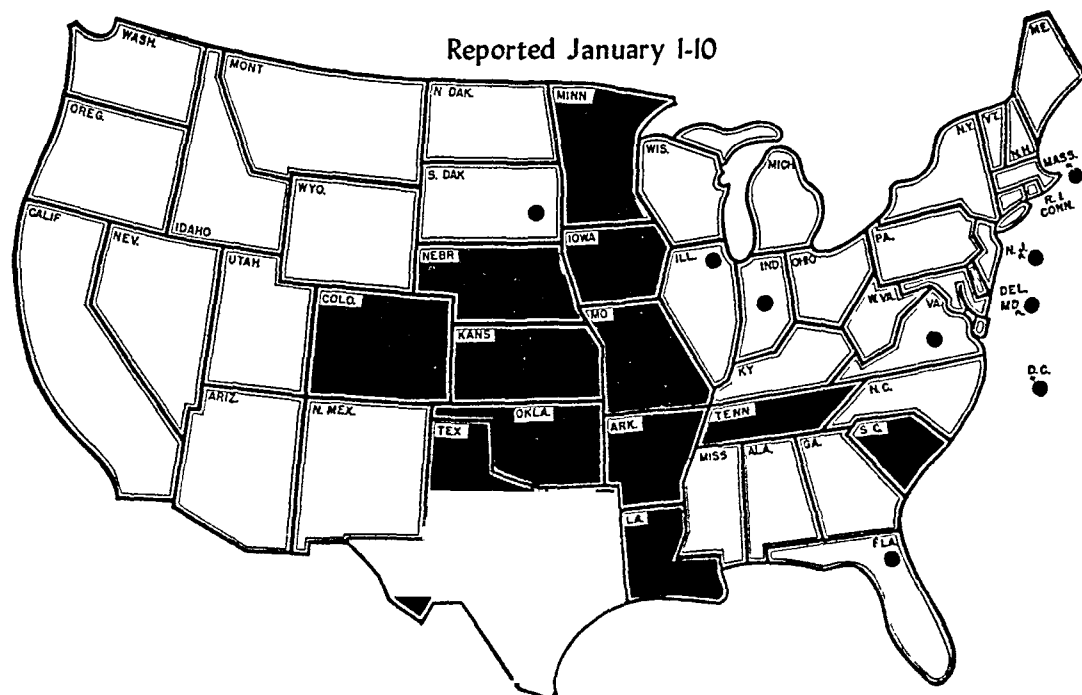
The theme for 1953 "Health is Wealth" is based on the economic value of health, which was emphasized in the discussions at the Fifth World Health Assembly, Geneva, Switzerland, in May 1952. The theme also is the main consideration in the World Health Organization monograph "The Cost of Sickness and the Price of Health," written by Dr. C.-E. A. Winslow, editor of the American Journal of Public Health.

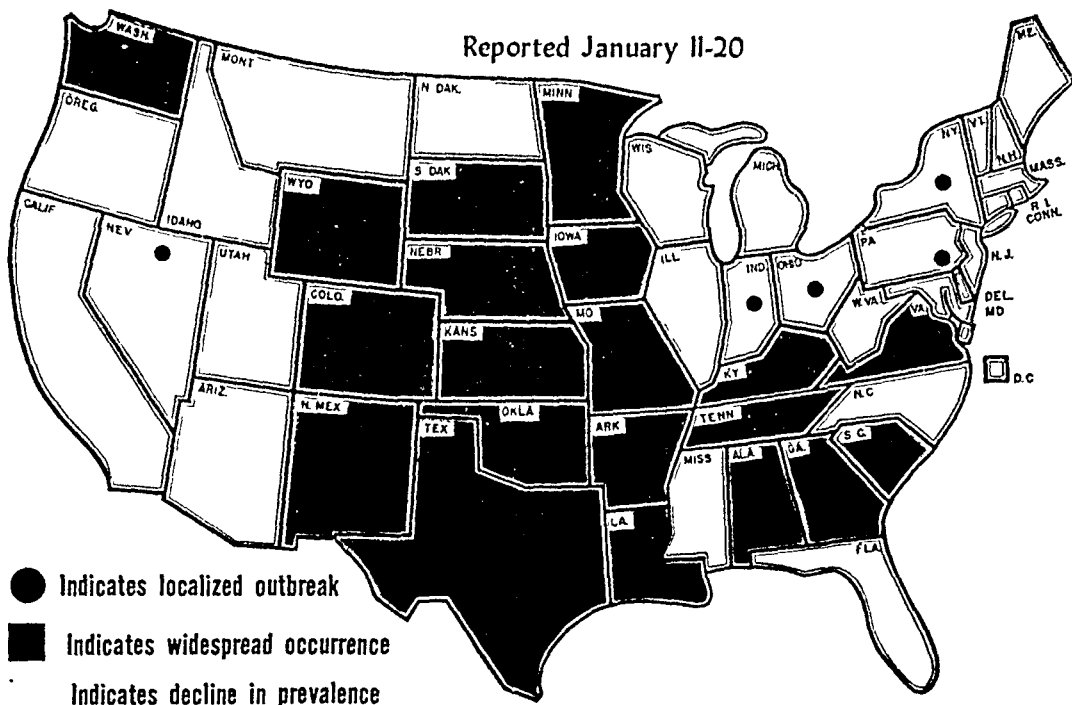
"Every step that can be taken toward lessening the burden of preventable diseases will not only diminish suffering and prolong human life; it will also increase productivity and promote prosperity," Dr. Winslow stated in the monograph.



Influenza Prevalence Trends

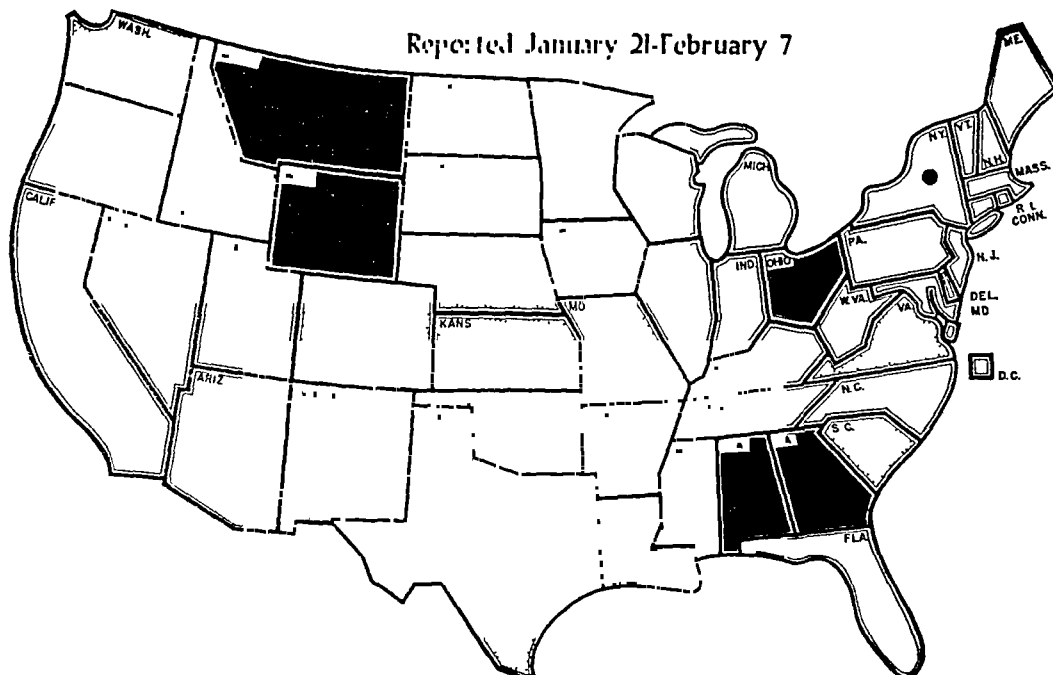
An A-prime type of influenza infection recently has been demonstrated in most parts of the country currently reporting respiratory disease outbreaks. At first infection was mild, with a low complication and a low death rate. Later reports indicated a somewhat higher mortality than usual. Localized outbreaks of respiratory disease began late in December—mainly in Colorado, Missouri, North Carolina, Illinois, Connecticut, and Oklahoma—among civilian, military, and institutional populations. A-prime infections in some of these groups were subsequently confirmed by serologic tests or isolation of the virus.





In the United States, 1952-53

During the first 10 days of January, respiratory disease was widespread in the central part of the country, and localized outbreaks occurred in the eastern part. Widespread outbreaks in some States and localized outbreaks in others continued during the next 10 days. The peak was reached late in January and early in February, though in the central part of the country the trend was already downwards. The true prevalence could not be determined. Some States made no reports, and others were not sufficiently informative to determine the extent of these infections, according to the National Office of Vital Statistics.



Proceedings of the Second Research Conference On Psychosurgery

The First Psychosurgery Conference was held in New York City in 1949 under the auspices of the National Institute of Mental Health, Public Health Service. Chaired by Dr. Fred A. Mettler of Columbia University, it devoted its attention to the criteria for the selection of psychotic patients for psychosurgery, such as topectomy, lobotomy, and gyrectomy.

The second conference, held in 1950, under Dr. Mettler's chairmanship, had as its theme the determination of the effects of psychosurgery and their measurement. The 2-day session covered such subjects as rating scales for psychotic patients, base-line data and psychiatric categories, evaluating the environmental situation of the mentally ill patient, and the study of affectivity, deterioration, regression, and creativity in patients following psychosurgery.

Among the points brought out by the discussants and presented in this publication was the need for a new approach to psychiatric categories, with the possibility of tying in some psychiatric subcategories to physiologic circumstances with resultant profit to psychiatric nomenclature. It was agreed that the scales presented were useful and well constructed, but "the psychiatrist himself still remains the most sensitive measuring instrument."

The viewpoint was presented that there is a "basic schizophrenia" underlying the schizophrenic psychosis; and that psychosurgery does not alter the basic disease process, but by relieving the stress of conflicting memories it may lessen the precipitating factors of the psychotic process.

Since depressed patients constitute another considerable group of patients for whom psychosurgery is

considered, affectivity was discussed. In this respect many problems were raised, for example, the relationship of anxiety to other affective responses; whether psychosurgery alters the affective states by inhibiting or facilitating activity and emotional expression; and whether it alters unconscious processes.

An analysis of creativity enumerated the four underlying abilities of that faculty as imagination, skill, problem-solving ability, and zeal. It was pointed out that the creative capacity is seldom up to the pre-operative level in psychosurgical patients, but by reducing anguish the operation may actually be followed by a rise in the level of creative ability.

Discussion also concerned the fact that all treatment procedures are aimed at the restoration of the patient to community life. A rating scale of family situations was presented as a measure of the degrees of stress in the situation to which the patient is exposed in the home. It was emphasized that for the patient who is returned to the community, the supportive attitude of the family is far more important than the physical environment. In like manner, the hospital adjustment of the patient is not necessarily a good index of his adjustment in a home situation which calls for self-direction.

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Proceedings of the Second Research Conference on Psychosurgery. (Public Health Service Publication No. 156) 1952. 116 pages. 75 cents.

Salaries of Local Public Health Workers April 1952

This study is the fourth in a series on salaries of selected public health workers begun in May 1948, in cooperation with the Association of State and Territorial Health Officers and the American Public Health Association. It contains information from 483 local health units, 303 local nonofficial health agencies, and

191 local boards of education. Data on public health nurses in the last two groups, usually published in supplements, were obtained and tabulated independently by the National Organization of Public Health Nursing and incorporated in this report for the first time.

The current study covers a wider range of professional classifications than was used in the three previous studies and includes for the first time data from health units serving populations of from 250,000 to 499,999 and 500,000 and over.

The data indicate that salaries of local public health workers in units serving areas of from 50,000 to 249,999 population advanced only moderately between April 1950 and April 1952. The greatest increase (27 percent) came to laboratory workers. Progressively smaller percentage increases were recorded for nurses, sanitary engineers, health officers, and sanitarians. Median salary intervals for those professional groups were (in dollars); health officers, 8400-8599; other public health physicians, 7000-7199; sanitary engineers, 5000-5199; supervising public health nurses, 4000-4099; professional laboratory workers, 3800-3999; sanitarians, 3200-3399; staff public health nurses, 3000-3099.

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Salaries of Local Public Health Workers, April 1952. (Public Health Service Publication No. 237) 1952. 83 pages; tables, charts. A limited number of copies available from the Division of State Grants, Public Health Service, Washington 25, D. C.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Effect of Fly Control on Diarrheal Disease In an Area of Moderate Morbidity

By DALE R. LINDSAY, Ph.D., WILLIAM H. STEWART, M.D.,
and JAMES WATT, M.D., Dr.P.H.

IN AN EARLIER study in Hidalgo County, Tex., flies were shown to be vectors of *Shigella* infections in an area of high diarrheal disease morbidity and mortality rates (1). The high rates and other features peculiar to that area were recognized as factors which might limit the applicability of this method of reducing such enteric infections in the more frequently encountered areas of low to moderate morbidity and negligible mortality. This paper presents the results of a study, very similar to the Texas study, made in such an area of low to moderate morbidity from diarrheal disease. The area selected is in southern Georgia. Its small communities are characteristic of the rural South in size, climate, and agricultural practices favorable to fly breeding and in community sanitation that allows flies ready access to human excrement.

Plan of Study

Fly control investigations were begun in Thomas County, Ga., in 1949. Of the six rural

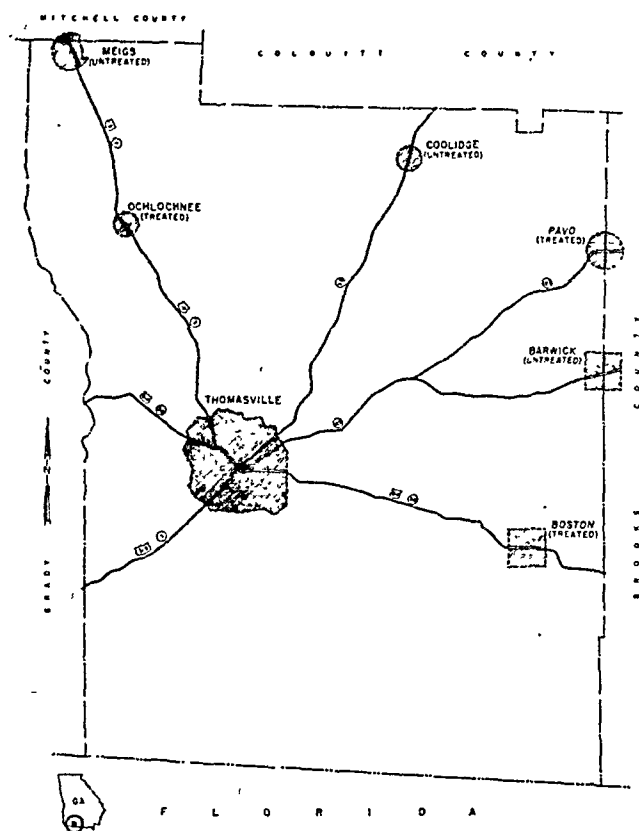
towns used in the study, Boston, Pavo, and Ochlochnee were selected for chemical treatment. Barwick, Coolidge, and Meigs, located between the treatment towns, were selected as untreated checks in an effort to equalize differences due to geographic location or agricultural practices (fig. 1).

Fly populations in the two groups of towns were measured by the Scudder fly grill method (2), and a minimum of the five highest grill counts per sample block was recorded. In the treated towns, all blocks were sampled weekly, to pinpoint areas in need of re-treatment. In untreated towns, representative blocks constituting only 10 to 20 percent of the total number of blocks were similarly sampled. The validity of this economy in sampling was established by comparable figures obtained when indexes of similar 10- to 20-percent samples, chosen by lot from the total samples of treated towns, were matched against the indexes of the total samples, as well as by supporting studies (3).

A town was re-treated when the average of the five high grill counts of flies exceeded three flies in any block. This lower re-treatment index, as compared with that used in the Texas study (1), was arbitrarily used in order to compensate for obvious differences in the two study areas. Blocks in the Georgia towns were much larger than those in the Texas towns, and numbers of fly attractants per block were higher. Thus larger populations of flies per index unit were represented. Comparison of the third high count averages in the Texas and Georgia areas indicated that the overall degree of fly

Dr. Lindsay is chief of the Thomasville Field Station of the Communicable Disease Center, Public Health Service, and Dr. Stewart is chief of the epidemiology unit of the station. Dr. Watt, formerly with the National Microbiological Institute, is now director of the National Heart Institute of the National Institutes of Health, Public Health Service. This paper is a third in a series of diarrheal disease control studies.

Figure 1. Location of study towns in Thomas County, Ga.



control achieved was comparable in the two areas. The third high count was used as an index, rather than the single high count, because it minimized vagaries due to single high concentrations of flies which sometimes were found.

Fly control in the treated towns was first accomplished by application of 5-percent DDT emulsion, using both space and residual spray methods. After 10 months of treatment, the high degree of DDT resistance which developed in the housefly (*Musca domestica* L.) population precluded further effective control with DDT. Dieldrin was therefore substituted in Pavo and in Boston. It was applied as a residual spray emulsion at rates of 50 mg. and 25 mg. of dieldrin per square foot of spray surface, respectively. Chlordan was substituted in Ochlochnee and was used as a residual spray emulsion applied at the rate of 100 mg. of chlordan per square foot of spray surface.

The effect of fly control on the prevalence rate of infection with *Shigella* and *Salmonella* organisms and on the rate of diarrheal disease

was measured by comparing the rates found in comparable population samples in the treated and untreated towns before, during, and after fly control. These rates were established by obtaining monthly rectal swab cultures from all children under 10 years of age in the samples, and monthly histories of diarrheal disease occurring in their families. Mortality rates from diarrheal disease were not used as a measure of the effect of fly control, because there were too few deaths for significant comparison.

The populations studied within the towns were in those neighborhoods having the highest proportion of children under 10 years of age. A disproportionate number of this age group was included since it has the greatest incidence of infection and disease due to *Shigella* organisms. The population figures for 1950 in the treated and untreated towns and in the samples selected in these groups of towns are given in table 1. The total populations of treated towns and untreated towns were approximately equal. The sample population included slightly less than one-half of the total population in each group of towns.

Results of Fly Control

Effects of the chemical control operations upon all common species of flies, considered as a group, are shown in figure 2. A 3-week moving average of the median or third high grill counts for all survey blocks is used as an index of the fly populations observed in the two groups of towns. Weekly fly counts were made for approximately 3 months before control op-

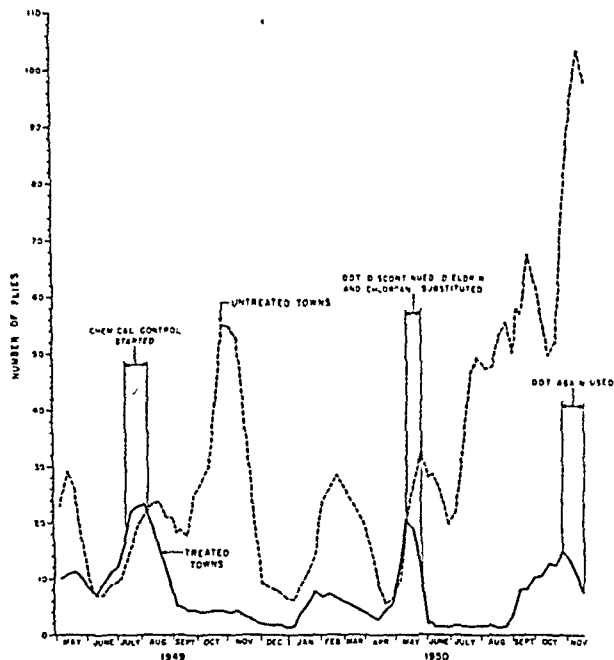
Table 1. Population for 1950 in the treated and untreated towns and in the samples selected in these groups of towns

Towns	Total population of towns ¹	Total population of sample ²	Children under 10 years of age in sample :
Treated.....	2,344	983	239
Untreated.....	2,325	1,007	260

¹ Preliminary report 1950 census, U. S. Bureau of Census.

² Census taken in study.

Figure 2. Effect of chemical control operations on all species of flies (3-week moving average of third high fly count).



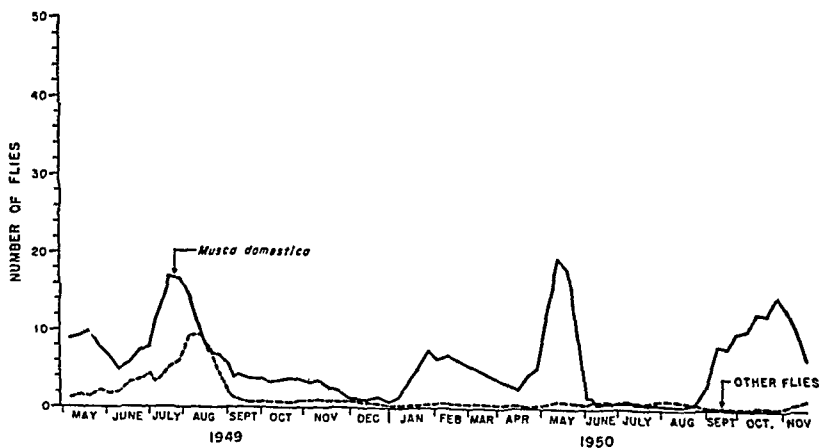
erations were begun, and, except for the first 3 weeks, index trends for both groups were very close. Control operations for 1949 began on July 18 in Pavo, on August 1 in Ochlochnee, and on August 10 in Boston. The intervals between these dates were taken up with the original treatment of the new town and re-treatment, as needed, in the town or towns previously treated. The fly population index of the treated group declined as each of the towns came under operational control. Normal seasonal increases in the fly population in the untreated towns continued into November 1949,

when cool weather curbed fly activity and breeding.

Warming weather in January and February 1950 resulted in rising population indexes in both groups of towns during January and forced intensification of operational control in the treated towns during February. The results of this control intensification can be seen clearly in comparing index lines for February in figure 2. Cool weather in March and early April held both fly breeding and activity in check and did not permit the taking of reliable population indexes through March. During the first 2 weeks of May the indexes for both groups rose sharply in spite of heavy reapplications of DDT in the treated towns.

Concurrent field observations and laboratory tests showed that houseflies (*M. domestica*) had become highly resistant to DDT, and with the rising mean temperature the ineffectiveness of DDT increased in accordance with principles established by Lindquist and associates (4, 5). This trend toward housefly resistance to DDT was established by laboratory tests of wild flies taken from the treated towns before it was reflected by increased grill counts in the field. As a result of these laboratory tests, conducted according to a standardized procedure reported by Lindsay and Haines (6), substitute insecticides for DDT were on hand when needed. These insecticides, dieldrin and chlordan, were applied as described in the plan of study between the dates of May 16-26. Good control was maintained in the treated towns until late August 1950, compared with an increased fly

Figure 3. Number of *Musca domestica* compared with other flies in treated towns of Ochlochnee, Pavo, and Boston, Ga. (3-week moving average of third high fly count).



population index for the untreated towns during July and August.

Throughout June and July 1950, the degree of fly control achieved by using dieldrin and chlordan was so nearly perfect that it was difficult to find individual flies, and concentrations of two or more flies were only rarely encountered. In late August, scarcely 12 weeks after the initial application of dieldrin and chlordan, it became evident from laboratory tests that housefly populations had gained immunity to these insecticides, as well as to DDT. Large populations were not found, as evidenced by the low fly index for the treated towns throughout August, but laboratory tests on small representative collections of these populations revealed a high degree of resistance to dieldrin and chlordan. These tests showed that dieldrin and chlordan selected houseflies with the same resistance factors. Chlordan resistance was found where only dieldrin had been used and dieldrin resistance where only chlordan had been used. After a high degree of dieldrin or chlordan resistance had been attained in field populations of houseflies, no dead or dying flies could be found as a result of the reapplications of these insecticides, and laboratory tests of wild flies showed no appreciable differences in the mortality of flies subjected to heavy residuals of dieldrin and of flies in the untreated checks.

Although DDT used against resistant houseflies would not produce satisfactory fly control, both dead and dying flies were easily found in the field following reapplication of DDT dur-

ing October and November 1950, and the mortality of wild flies in laboratory tests against DDT residuals was significantly higher than in the untreated checks. Fly control by various field combinations of insecticides and of application methods was then attempted, and the decline shown in the treated towns' index during November was due mainly to reapplication of DDT sprays, probably enhanced by cool weather (4, 5).

As previously found in the Texas study, all marked failures in fly control operations were due to inability to control the common housefly. This fact is illustrated in figures 3 and 4, presented on scales identical to those in figure 2. The major role played by the housefly in developing resistance to insecticides is quite apparent in figure 3. It was the only species that increased significantly during the use of the insecticides.

In the three untreated towns all index points above 10 for species other than the housefly were due to seasonal increases in the single subtropical species *Sarcophagula occidua* Fabr. of the family Sarcophagidae (fig. 4). This species breeds abundantly in animal excrement and reaches its peak of breeding in late fall. An abundance of favorable media in the rural towns under study permitted large-scale breeding.

When considered in terms of habits and control difficulties, houseflies appear to be the primary species concerned as *Shigella* vectors. Results of ecological studies by Haines (?) of the

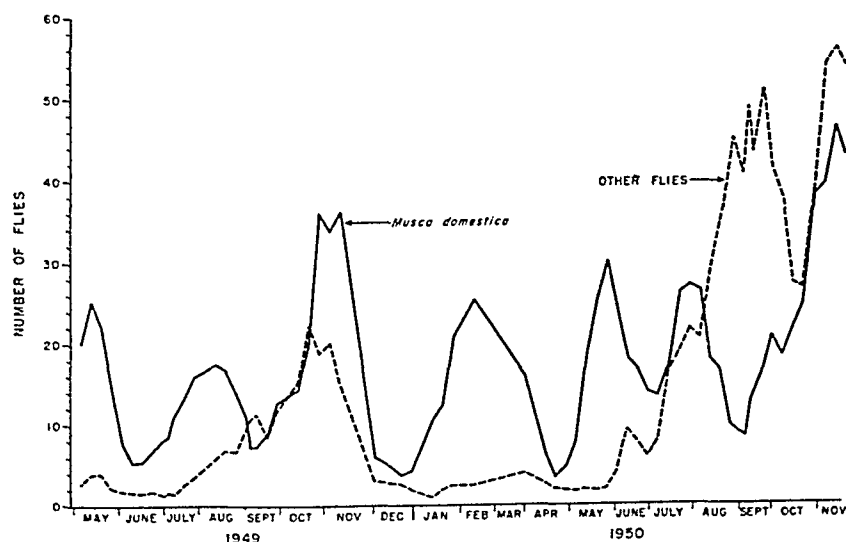


Figure 4. Number of *Musca domestica* compared with other flies in untreated towns of Meigs, Coolidge, and Barwick, Ga. (3-week moving average of third high fly count).

commonly occurring flies showed that houseflies were highly adaptable in using a wide variety of naturally occurring refuse as breeding media. Refuse was classified by source and nature into approximately 20 categories, and investigation revealed that houseflies bred in all categories, sometimes in numbers far smaller than the species most favored, but nevertheless in significant quantities. Since by qualitative standards the types of media most favorable to housefly breeding, such as animal excrement and bedding in stables, were also highest in frequency of occurrence and in volume in the study area, the greater relative abundance of houseflies at all seasons, as compared to that of other species, is to be expected.

Diarrheal Disease

Data on the prevalence of *Shigella* infections in children under 10 years of age in treated and untreated towns are grouped in two ways: by quarters of years and by periods covered before, during, and after fly control (table 2). At the beginning of the study, prevalence rates in the two groups of towns approximated one another. With the beginning of fly control operations in July 1949, the prevalence rate in the treated towns fell, and remained low, whereas the rate in the untreated towns continued high. This relationship remained during the period of good fly control from September 1949 to late August 1950. When effective fly control was lost, after August 1950, the percentage of

Table 2. Prevalence of *Shigella* infections in children under 10 years of age in the treated and untreated towns, April 1949 to December 1951

Period: Month culture done	Treated			Untreated			Probability "P"
	Number of cultures	Number positive	Percent positive	Number of cultures	Number positive	Percent positive	
Before fly control:							
April.....	220	8	3.6	398	20	5.0	0.26
May.....							
June.....	478	14	2.9	623	23	3.7	
August.....							
Total.....	698	22	3.2	1,021	43	4.2	
During fly control:							
September.....	417	6	1.4	595	15	2.5	.0001
November.....							
December.....	451	2	.4	609	20	3.3	
February.....	437	2	.5	681	11	1.6	
March.....							
May.....	487	4	.8	679	14	2.1	
June.....							
August.....							
Total.....	1,792	14	.8	2,564	60	2.3	
After fly control:							
September.....	379	17	4.5	565	25	4.4	.06
November.....							
December.....	271	9	3.3	346	7	2.0	
February.....	393	10	2.5	506	6	1.2	
March.....							
May.....	366	15	4.1	449	11	2.4	
June.....							
August.....	294	14	4.8	226	9	4.0	
September.....							
November.....	84	2	2.4	77	1	1.3	
December.....							
Total.....	1,787	67	3.7	2,169	59	2.7	
Grand total.....	4,277	103	2.4	5,754	162	2.8	

Shigella infections in treated towns rose until, in October 1950, it exceeded the rate in untreated towns. For the next 12 months, rates in the treated and untreated towns remained on a level similar to that before fly control started. The percentage of *Shigella* infections before, during, and after fly control is shown in figure 5.

The number of isolations of *Salmonella* organisms during this study was quite small. However, there were just as many isolations made in treated towns as in untreated towns during effective fly control. This lends weight to the previous report (1) that fly control did not influence the spread of these organisms in the same way that it did the *Shigella* group.

The crude and standardized attack rates per 1,000 a year for reported diarrhea in children under 10 years of age were almost identical in the treated and untreated towns for the 8 months before fly control operations began (table 3). During the year fly control was maintained, the rate of reported diarrheal disease was appreciably lower in the treated towns, but showed little change in the untreated towns. After fly control was lost, the rate of diarrheal disease in treated towns rose to slightly below that in untreated towns. The significant change in the attack rate of diarrheal disease in treated towns during the fly control period is shown in figure 6.

Reversal of the treated and untreated towns in order to duplicate the effect of fly control on diarrheal disease was impracticable because of the relatively high insecticidal resistance in

Figure 5. Prevalence of *Shigella* infections in children under 10 years of age before, during, and after fly control.

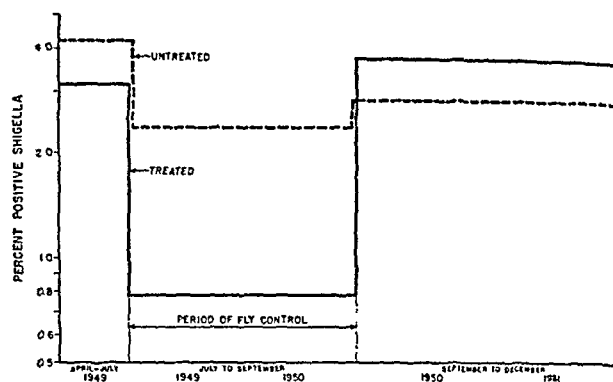
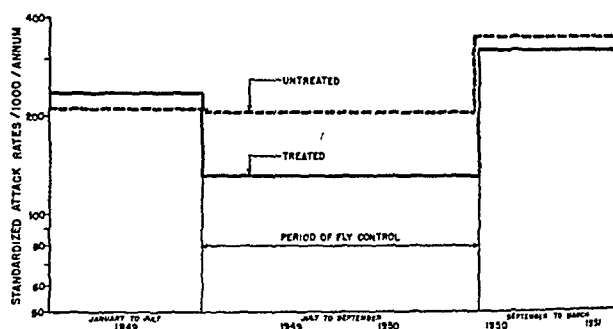


Figure 6. Standardized attack rates for diarrhea in children under 10 years of age before, during, and after fly control.



the previously untreated towns. This resistance, detected by laboratory tests, could have resulted from widespread individual use of household and agricultural chemical insecticides.

Table 3. Crude and standardized attack rates for reported diarrhea in children under 10 years of age before, during, and after fly control

Period	Treated					Untreated					Probability "p"
	Per-son-months observed	Cases	Crude rate ¹	Ex-pected cases	Stand-ard rate ¹	Per-son-months observed	Cases	Crude rate ¹	Ex-pected cases	Stand-ard rate ¹	
Before fly control: Jan. 1949 through Aug. 1949-----	2, 258	39	207	44. 2	235	2, 660	46	208	46. 8	211	0. 99
During fly control: Sept. 1949 through Aug. 1950----	3, 084	29	113	34. 0	132	3, 511	57	195	60. 8	208	. 015
After fly control: Sept. 1950 through Jan. 1951-----	790	17	258	21. 3	324	896	25	335	25. 6	355	. 40

¹ Per 1,000 a year.

The fact that the period of effective fly control was the only time during the 32 months of this study that the prevalence rate of *Shigella* infection was significantly lower in the treated towns than in the untreated towns is convincing evidence that flies were vectors of *Shigella* organisms. The lowering of the attack rate for diarrheal disease during the period of fly control indicates that a significant portion of this diarrhea resulted from infection with *Shigella* organisms, and again points out the importance of *Shigella* infections as a cause of diarrheal disease.

Summary

Results of this study demonstrated that during effective fly control in an area of moderate diarrheal disease morbidity, the prevalence rate of *Shigella* infections and the morbidity rate from diarrheal disease were significantly lowered.

Chemical insecticides of the residual type were used for control of adult flies. The development of housefly (*M. domestica*) resistance to the DDT initially used resulted in its ineffectualness in maintaining fly control after 10 months. The dieldrin and chlordan sprays

substituted for DDT resulted in excellent fly control for about 3 months. After that period these insecticides became even less effective than DDT.

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Vending Stand Program Aids Blind

More than 1,700 blind vending stand operators and employees earned over \$3.6 million during 1952, according to figures released by the Office of Vocational Rehabilitation, U. S. Department of Health, Education, and Welfare. These are the highest net earnings ever recorded by the blind men and women who operate vending stands under the guidance of the Nation's State-Federal program for rehabilitating disabled civilians. Gross sales exceeded \$18.6 million.

The vending stand program provided in 1952 self-sustaining work for 1,513 blind operators, 196 blind assistants, and 412 other workers employed by the operators.

Five hundred and fifty-eight of the 1,479 vending stands are operated under the program in Federal buildings. The others are on private or non-Federal public premises. The investment in equipment and merchandise totals more than \$2.3 million.

he 1952

Encephalitis

Sacramento River Valley

San Joaquin River Valley

*The Great Central Valley
of California*

OUTBREAK in California

By WILTON L. HALVERSON, M.D., Dr.P.H., WILLIAM ALLEN LONGSHORE, Jr., M.D., M.P.H.,
and RICHARD F. PETERS, B.S.

DURING THE PAST summer California experienced the highest incidence of infectious encephalitis thus far recorded in this State. A total of 729 human cases was reported from 37 counties during the June to October encephalitis season. Ninety-four percent (689) of the cases occurred in the 20 Central Valley counties. Over half of the cases were confirmed by laboratory tests. Fifty-one deaths were listed as having resulted from this disease. Four hundred cases of encephalitis in horses were reported during the season.

The present account is concerned primarily with the emergency plan worked out to cope with the 1952 outbreak of infectious encephalitis caused by one or the other of two viral

agents, namely, viruses of western equine encephalomyelitis and of St. Louis encephalitis. Special studies were undertaken along with emergency control activities to gain as much additional epidemiological information as possible regarding infectious encephalitis, which is endemic in various parts of the country and which becomes epidemic under conditions which are not well understood.

California History, 1938-51

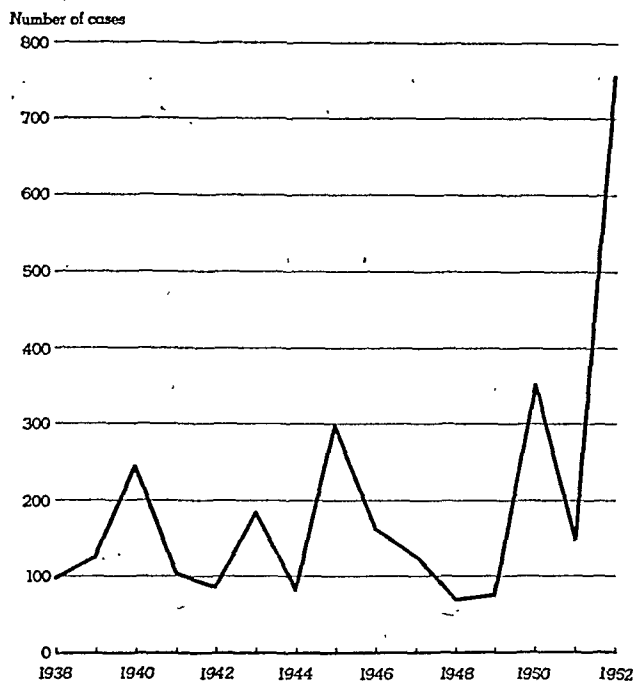
Infection of man with western equine encephalomyelitis virus in California was first suggested by pathological specimens in 1932 but was not confirmed by isolation of the virus until 1938. Prior to that time the virus was considered to produce a disease only in horses. Human infection with the St. Louis virus was first recognized in California in 1939. In the years following the recognition that these agents could cause infection in man, human illness attributable to these viruses in California has been found to be relatively common in the Central Valley areas (see map). Since 1938, certain observations have been recorded concerning the epidemiological and clinical aspects of enceph-

Dr. Halverson is the director of the California State Department of Public Health. He has recently been to South America as a consultant on public health affairs. Dr. Longshore is assistant chief, bureau of acute communicable diseases, and Mr. Peters is chief of the bureau of vector control of the department. Another member of the staff of the department, Arthur C. Smith, took the photographs used in this article.

alitis caused by these two specific agents as they have occurred in California.

There has been a wide variation from year to year in the number of cases of infectious encephalitis reported. Incidence of the disease in California was highest in 1945 and 1950, when

Human cases of acute infectious encephalitis reported in California, 1938-52.



320 and 357 human cases, respectively, were reported. The lowest number of cases reported was 71 in 1948. Laboratory studies have been carried out on a good percentage of these cases, particularly since 1945, when the State viral and rickettsial disease laboratory began to perform serologic tests as a routine procedure.

Cases of infectious encephalitis have been reported from 46 of the 58 counties in California. The preponderance of cases, however, has been reported from the Central Valley areas (see map), with the largest number in Kern, Fresno, San Joaquin, and Tulare Counties. Moreover, it is considered significant that the laboratory confirmed human cases of western equine encephalomyelitis and St. Louis encephalitis have been confined almost exclusively to the Central and Imperial Valleys, leaving the coastal areas relatively unaffected.

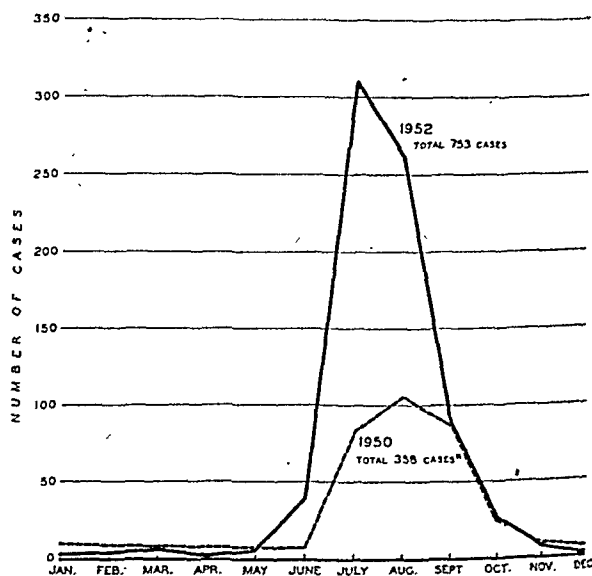
Laboratory confirmed cases have been reported from only 23 counties of the State, and

distribution within the State is limited essentially to the hot, irrigated agricultural sections of the Central and Imperial Valleys. This geographic distribution appears to reflect to some degree the distribution and density pattern of the principal mosquito vector, *Culex tarsalis*. Also, laboratory confirmed cases have occurred only during the months of June through October.

Experience gained over a period of some 12 years, with the seasonal occurrence of endemic arthropod-borne encephalitides in the Central and Imperial Valleys of California, proved valuable in carrying out the emergency encephalitis program in 1952. The following factors also contributed in an important way to the success of the emergency program:

1. The excellent diagnostic facilities provided by the California State Health Department's viral and rickettsial disease laboratory.

Human cases of infectious encephalitis reported in California, by month of onset, 1952 and 1950.



*Total for 1950 includes 6 cases with date of onset not stated.

2. The alertness of the private practicing physician to this particular illness.

3. The awareness of the problem on the part of local health departments.

4. The intensified activity of the mosquito abatement districts.

5. The good working relationships between

the State health department, local health departments, and mosquito abatement districts.

Mosquito-Breeding Factors

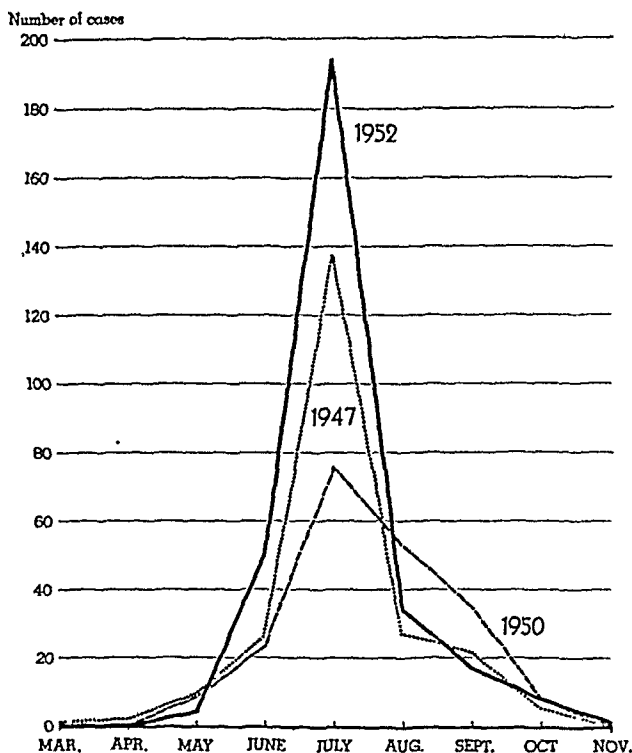
During the winter of 1951-52 one of the heaviest snow packs ever recorded was deposited upon the mountain ranges of California, and rainfall throughout the State was extraordinarily heavy. Winter and springtime average temperatures were relatively moderate, with only a few short periods of critically low temperature to work adversely upon the overwintering mosquito population. These conditions apparently proved optimum for the rapid development and biotic potential of the *C. tarsalis* population during the early spring. Not only was the distribution of this mosquito more general in 1952, but extensive water in the river-bottom lands and various low flooded areas were observed to produce the insect in extraordinary numbers. As is characteristic in California, mosquito population peaks were first reached in the lower San Joaquin Valley and progressed northward through the spring and summer.

Within the 21 mosquito abatement districts comprising the area under organized mosquito control in the Central Valley, intensive control operations were directed against *C. tarsalis*. The breadth of the breeding area, however, exceeded the physical resources available and it was not possible to prevent emergence of a large portion of the adult mosquitoes.

The resistance of *C. tarsalis* to DDT and other chlorinated hydrocarbon insecticides, which had been demonstrated conclusively the previous season, appears to have played a significant part in reducing the effectiveness of chemical control measures used.

Mild spring climatic conditions, aside from greatly favoring the reproduction of *C. tarsalis*, apparently increased its longevity. Moreover, the 1952 flights of this mosquito are believed to have greatly exceeded the range earlier attributed to it. Earlier scientific measurement of the flight pattern of *C. tarsalis* had shown it capable of flights of approximately 2 miles; indications this year were that it flew 5 to 10 miles or more.

Equine encephalomyelitis cases reported in California, by month, 1947, 1950, and 1952.



By June most of the mosquito abatement districts in the San Joaquin Valley had felt the impact of the *C. tarsalis* problem and every emergency measure available was put to work against this mosquito. A further factor of significance was that the production of this mosquito in such large numbers led to its invading homes and biting man in a manner not previously observed. Ordinarily, this mosquito seeks and prefers the blood of either domestic or wild fowl.

By July the important aquatic sources of *C. tarsalis* had largely changed from characteristic natural sources to places incidental to the use of irrigation water in agriculture. This change, and the apparently decreasing adult mosquito populations, gave promise that *C. tarsalis* populations would also subside. In addition, the Central Valley experienced several days of maximum temperatures exceeding 100° F., a condition unfavorable to adult mosquito survival. This provided additional hope that the mosquito population would decrease to a level approaching normal for that time of the year. However, such optimism proved to have been ill-advised.

Beginning of the Outbreak

Since 1943 it had been the practice of the Hooper Foundation of the University of California and the State health department to assign medical personnel to the Kern General Hospital at Bakersfield, during the summer months, to observe all cases admitted to the communicable disease ward. Histories and adequate diagnostic specimens, with thought for the encephalitides, were taken routinely. When a visit was made to the Kern County area in early July for the purpose of placing a student, an unusual increase in the number of encephalitis cases was noted. Some 25 suspect admissions to the Kern General Hospital during June had been recorded.

As July progressed, an increased number of cases of encephalitis was noted from the lower San Joaquin Valley area, where the disease ordinarily makes its first appearance, and two human cases were reported by the health officer of Madera County. Also, the virus laboratory was beginning to receive increased numbers of diagnostic specimens from patients suspected of having encephalitis.

Initial State Planning

In view of these developments, a meeting was held on July 14, 1952, in the office of the director of public health to review the situation with the mosquito abatement officials and the advisory committee of the bureau of vector control. Following this conference a press release was issued stating that a potential epidemic of encephalitis was at hand. A previous telephone conference had been held with the 20 health officers of the endemic areas explaining the plan of action and pointing out that a news release was to be made. Advance copies of the State release were sent to the local health officers so that simultaneous statements could be made in the local press. A second meeting with the vector control advisory committee was held on July 28, 1952, to which all of the health officers of the counties in the endemic areas of the State were invited.

Out of this and a later series of meetings came plans for an intensified program directed specifically toward the suppression of the *C. tarsalis*. This program, "Operation *Culex tarsalis*,"

was created to augment resources of the 21 existing mosquito abatement districts in the Central Valley and to assist local areas outside these districts in planning emergency control operations.

Administrative Problems

Upon declaration of the emergency, the director of the State department of public health designated the chief of the division of environmental sanitation to coordinate the overall program. The bureau of acute communicable diseases was assigned full responsibility for conducting the epidemiology, and the bureau of vector control was likewise charged with accomplishing the necessary mosquito control. The division of administration provided direct assistance in facilitating the procurement and delivery of needed equipment, materials, and supplies. The viral and rickettsial disease laboratory organized its facilities to perform all the necessary laboratory functions.

At the same time epidemiological followup of cases of encephalitis occurring in the Valley areas was intensified. All indications pointed to the likelihood that the number of cases would increase. It was forecast at that time that there would be between 500 and 700 cases for the disease year. Close followup was thought to be desirable to obtain complete epidemiological data on all cases of central nervous system disease with fever admitted to the hospitals in the 20 counties involved. It was thus necessary to arrange for increased activity on the part of the virus laboratory to process the additional specimens which would be secured through the intensified diagnostic effort.

State and Federal Aid

As State and local agencies moved into action, the Governor, on August 1, 1952, made \$250,000 in emergency State funds available. This grant of funds enabled the State health department to provide the financial assistance necessary to marshal materials and manpower for the intensified operation. Many of the Central Valley counties also made funds available for the control program.

At the request of the State director of public

health, the Federal Public Health Service dispatched to California, from stations in various parts of the country, 22 technical personnel from its epidemic intelligence service and other branches to aid both the mosquito control work and epidemiological investigations.

Knowing that professional and technical assistance was forthcoming, the emergency program was planned so that the project would operate in two major fields: a field epidemiological program under the guidance and supervision of the bureau of acute communicable diseases, and an emergency mosquito control program to be carried out under the guidance and supervision of the bureau of vector control.

Epidemiology Program

The emergency epidemiological planning embraced two areas: central office activities, which included the modification of reporting procedures and the issuing of laboratory diagnostic notifications, and emergency field epidemiology, which made use of the services of personnel from the Federal Public Health Service.

The virus laboratory reported to the bureau of acute communicable diseases the results of blood tests and the receipt of first bloods (the first blood specimen of paired series required for diagnosis) submitted for diagnostic encephalitis studies. This information, together with the information obtained in the routine processing of morbidity cards sent in by local health departments, was used to alert the field teams to possible diagnostic cases so that master lists of suspected cases could be prepared for the field personnel.

The field epidemiology program was set up on the basis of four zones, covering the endemic areas of the State. The epidemiology teams—2 physicians and 1 veterinarian—had headquarters in the cities of Sacramento, Stockton, Fresno, and Bakersfield. Each operated through the local health departments and their respective county hospitals, which receive the majority of cases. The epidemiology teams also covered the counties adjacent to headquarters. The zones and their headquarters were:

Zone 1. Headquarters at Sacramento—including the counties of Sutter, Yuba, Yolo, Placer, Sacramento, and Butte.



PLANNING AND ADMINISTRATION

Top: Discussing distribution of encephalitis cases with the San Joaquin County health officer. **Center:** Planning residual spray program in Stockton. **Bottom:** Emergency encephalitis control staff meets at Fresno.



EPIDEMIOLOGY

Above: An interview with the family of a patient. Top right: Interviewing an encephalitis patient in the Stockton County Hospital. Lower right: Taking a blood sample from a patient's father.



Zone 2. Headquarters at Stockton—including the counties of San Joaquin, Stanislaus, and Merced.

Zone 3. Headquarters at Fresno—including the counties of Madera, Fresno, Kings, and Tulare.

Zone 4. Headquarters at Bakersfield—including the county of Kern.

The personnel from the Public Health Service's Communicable Disease Center, augmented by members of the State staff, were detailed to the zones. Two physicians were assigned to each zone and a veterinarian to each two zones. The majority of these emergency assignments were for 1 month. This necessitated replacements from time to time due to commitments of the assignees to return to their previous stations. While these replacements could not be avoided, the lack of continuity in the conduct of the epidemiological work was marked, and there was continuing need for orientation of new assignees.

The objective of the field epidemiological studies was to obtain laboratory confirmation

of cases of encephalitis and to secure as early and completely as possible the detailed epidemiological information concerning the disease in both humans and horses. The epidemiology teams were so placed that they would be able to undertake studies immediately upon receipt in the field of reports of suspected cases. Briefly, the field operations included these three elements:

Human Cases. In the four epidemiology zones, all known central nervous system encephalitis cases with fever were followed closely. Attempt was made to collect blood from these individuals in the acute and in the convalescent stages of the disease and to obtain complete epidemiological data. Autopsy specimens were secured on fatal cases whenever possible. The great majority of the blood specimens were taken by the hospital staffs, but collection of blood from discharged convalescent patients was the responsibility of the epidemiology teams. Specimens were tested in

the State laboratory by complement fixation or animal neutralization.

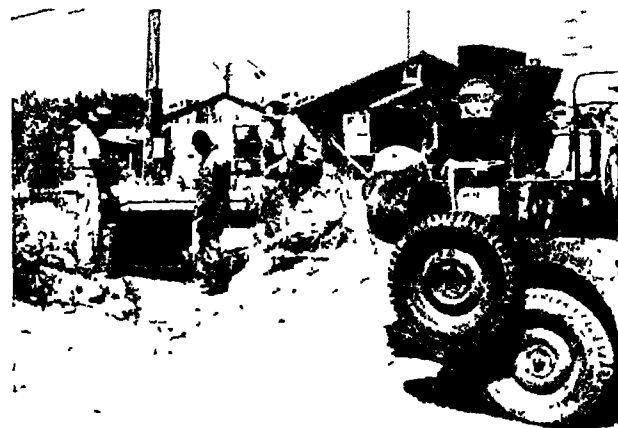
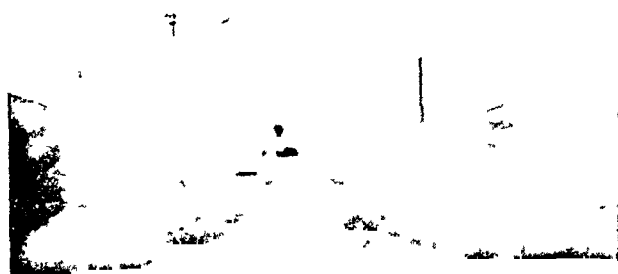
Two auxiliary studies were undertaken in special areas. In zones 1 and 2 an associate survey was attempted in which all household associates of known cases were bled once to determine their immunity status. The second special program, carried out in the Fresno County and Stanislaus County Hospitals, included a serologic survey of all febrile hospital admissions, in an attempt to broaden the clinical basis for the diagnosis of encephalitis. When possible, blood specimens were taken both during the acute and convalescent stages of the disease on all febrile admissions to the hospital, regardless of admission diagnosis.

Horse Cases. The State department of agriculture furnished reports on all known cases in horses. Veterinarians on the epidemiology teams collected and submitted to the virus laboratory as many paired bloods as could be obtained from clinical cases in horses and, when possible, secured post-mortem brain specimens for virus recovery and identification.

Special Studies in Outlying Areas. Epidemiological studies were made in selected areas outside of the Central Valley where cases in humans or a large number of cases in horses had been reported. The studies were particularly concerned with the fringe areas outside of the valley counties in order to determine the geographic distribution of the disease. Verification of *C. tarsalis* prevalence was sought and, when possible, mosquito pools were collected for virus recovery studies. These special studies were performed by teams of physicians, veterinarians, and entomologists operating from headquarters on special assignment.

Mosquito Control Program

With *C. tarsalis* mosquitoes already numerous, practical decisions had to be made with respect to control measures which would reduce the hazard to the majority of the residents of the valley. This logically resulted in a plan which gave priority consideration to towns and cities and adjacent suburban areas. Any effort to cover the entire valley would have diluted the control resources to such an extent that the



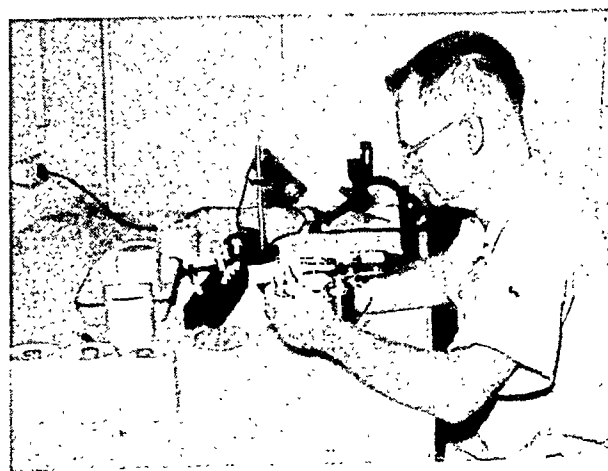
VECTOR CONTROL OPERATIONS

Top: Spraying a cotton field for *Culex tarsalis* larvae near Porterville. **Center:** Laying down an aerosol fog at a fairgrounds near Colusa. **Bottom:** Larvaciding at home of an encephalitis patient near Stockton.

prospect for accomplishment would have been generally negated.

Since the 21 mosquito abatement districts in the valley had been conducting expanded activities against *C. tarsalis* for a month or more, their principal need was for additional funds with which to expand and further intensify their emergency activities. The uncontrolled

ENTOMOLOGICAL AND VIRUS RECOVERY OPERATIONS



Top left: Collecting *Culex tarsalis* adults in chicken shed at Willows. Top right: Dipping for mosquito larvae in a cotton field at Porterville. Lower left: Sorting mosquitoes. Lower right: Sealing in tubes for shipment to the Virus and Rickettsial Disease Laboratory.

portion of the valley, however, required a complete plan to develop local participation and to provide technical personnel who could direct operations and get control work under way immediately. The same general plan of controlling mosquitoes was recommended for both the mosquito abatement districts and the uncontrolled territory. This consisted of methods designed to reduce an existing adult mosquito population and, if possible, to maintain it at a low level for the period of the emergency.

Essentially, the mosquito control program had three parts: (a) space (aerosol) spraying at frequent intervals; (b) barrier spraying of a quarter mile band on the periphery of each city and town; and (c) intensive larviciding or correction of mosquito sources within cities and towns and outward to a radius of 2 miles.

Control teams were organized combining Communicable Disease Center personnel with members of the staff of the bureau of vector control. Six such teams were established and dispatched to the six major uncontrolled areas of the Sacramento and San Joaquin Valleys, which include all or parts of Tehama, Glenn, Colusa, Placer, San Joaquin, Fresno, Tulare, and Kings Counties. Each team consisted of an engineer, an entomologist, and at least one vector control officer.

Since State funds were largely consumed in the purchase of spray equipment and insecticides, the teams were obliged to stimulate local participation in each individual mosquito control effort. Wherever local health departments were available they were used as the nucleus for conducting and encouraging the mosquito control operations. In some localities the office of the agricultural commissioner served this function in lieu of the health department. As a whole, the response by local officials to the emergency was very good. Local funds were made available in many localities to employ operators. In some cases local workers were loaned to the cause. Each team was provided 1 aerosol machine, 8 exhaust aerosol generators for installation on local vehicles, and 33 cylindrical-type hand sprayers, plus all of the spray equipment which could be recruited in each zone. DDT and diesel oil were provided

wherever needed. Airspray operations were conducted in certain areas where this method of operation was indicated.

The bureau of sanitary engineering assisted by inspecting and obtaining rapid treatment or correction of mosquito sources associated with community sewage disposal lands. The bureau of health education provided two health educators to assist the local health departments and other agencies participating in the emergency program and otherwise to facilitate the securing of local support and participation. A leaflet, "Kill Mosquitoes, Protect Your Family From Encephalitis," which contained helpful suggestions to the individual householder, was distributed liberally by local health departments and mosquito abatement districts throughout the Central Valley.

Entomologists, in addition to sampling mosquito prevalence and guiding control operations, collected and submitted over 1,100 pools of mosquitoes to the viral and rickettsial disease laboratory for virus recovery studies.

A Note in Summary

This brief account outlines the organization and plan used in conducting the emergency epidemiology and mosquito control programs in California during the summer of 1952. As is characteristic of any emergency, administrative problems were encountered in the course of this antientcephalitis effort. There was, for example, the lack of a previously conceived specific plan, the problem of how to utilize most effectively the personnel unfamiliar with California conditions, the matter of forced rotation of personnel, communications, fiscal arrangements for participating personnel, and procurement lag. These problems will be covered in detail in a later report.

At this writing it is premature to attempt to evaluate the epidemiology of the outbreak or to comment on the effect of the mosquito control effort in arresting or altering the course of events. Upon completion of the analysis of the multitudinous data collected on both aspects of the subject, such conclusions will be duly reported.

Time Study of Public Health Activities In Mississippi

By J. A. MILNE, M.D., M.P.H., MARGARET E. RICE, M.S., JOHN B. HOZIER, M.D., M.P.H., and
GRACE B. TARANTO, B.A.

OF IMMENSE potential value to the public health administrator in planning and executing an adequate public health program is the knowledge of the relative amount of time and effort devoted to each of the categories of public health service. Selection of the best means for determining this relative emphasis among program activities, however, presents a problem of some import. There are possibly infinite varieties of ways for the determination of emphasis among activities, each having certain merits when applied to a particular situation. The time study is a basic approach to the measurement of effort expended when dealing with a multiplicity of activities.

The Setting of the Problem

Public health needs have changed dramatically in the last 10 years. Concepts of a good public health program, and the services it should include, likewise have changed. A program of 10 years ago did not provide many of the services which today are considered necessary if recognized needs are to be met. Even today, it has not been possible to supply

the minimum services essential in many communities.

The public health administrator not only must accept today's challenge but also must foresee and plan for future needs. It is as much his responsibility to work now for the expansion required to meet future needs promptly and efficiently as it is to provide currently the best possible service with the money and personnel at his disposal.

With pressures for more services in new and broader areas constantly building up around the public health worker, the evaluation of day-to-day operations frequently has been neglected. It is readily apparent that these same pressures, which urge more, better, and quicker services, make it doubly important that only essential and productive activities be conducted.

A sound, objective evaluation of a public health program is difficult in many instances. Programs have evolved so rapidly that the definition and the development of adequate measures of progress have not kept pace.

The Need for Bench Marks

To determine progress in any sphere, it is first necessary to know just what is being done at present. In the health department, information concerning activities and services is furnished in a variety of ways. There are annual program reports, local activity reports, special project reports, financial and statistical reports, and others. Each ordinarily portrays or emphasizes only a segment of the program.

Dr. Milne is director of the division of county health work, Mississippi State Board of Health, Jackson, and Miss Rice is supervisor of the statistical service for the board. Dr. Hozier and Mrs. Taranto are with the Public Health Service in Region VI, Dr. Hozier as general medical consultant and Mrs. Taranto as public health representative.

For comparative studies of program emphasis, however, actual numbers of visits or counts of services to individuals cannot, in most instances, be used, for one type of visit or service may consume several times the amount of time and effort that goes into another. Therefore, the determination of relative emphasis among the many health department programs cannot be made readily from material currently collected or assembled for other purposes.

Time Studies: Pro and Con

For many years, public health workers have been discussing the pros and cons of time studies of public health activities. The most commonly voiced arguments against time studies are that they are too expensive, too complicated in themselves, too time-consuming, or that they are not representative of actual operations if limited in scope and in the period of time covered.

Many time studies have been made which brought forth such a volume of detailed information that funds and personnel were not available to tabulate and analyze the mass of collected material. Also, results of some have proved unsatisfactory partly because of various defects in construction of the form, inadequate instruction of participants, and selection of a period of time not representative of the agency's activities.

Careful planning before the study is begun, however, should eliminate most, if not all, of the factors which are responsible for major criticisms of time studies.

Arguments favoring time studies aver that a time study of public health activities will produce information sorely needed by the public health administrator, specifically the percentage of the agency's total time devoted to each category of service. This information is of inestimable value to the administrator in determining whether or not the programs currently receiving the greatest emphasis are also the programs shown by the State's vital records and other sources of information to be those which should receive the greatest concentration of public health effort.

Mississippi's Objectives

A time study recently completed by the Mississippi State Board of Health dealt with the

activities of all members of the staff and represents a useful approach to time study procedure, particularly in simplicity of execution and in reliability of results.

The immediate objective of the Mississippi time study was the justification of categorical grant expenditures — specifically earmarked funds received by the State board of health from Federal, State, and local sources. An urgent question was being asked: Is the Mississippi State Board of Health properly discharging its obligation to disburse all monies in accordance with Federal and State requirements?

The study was designed to be broad enough in scope not only to serve its immediate purpose but also to provide the basic background data for evaluating the overall State public health program. It was made with what was considered to be a minimum expenditure of time, money, and effort on the part of both participants and directors of the study.

Methodology

The study was made during the fiscal year 1951-52 and involved all employees in the central office of the Mississippi State Board of Health and in the local health departments. Plans for the study were made in consultation with staff members in the local health departments as well as in the central office. Designs for tabulation and analysis were developed well in advance. Every effort was made to define clearly the purposes of the study. Prior to its initiation, group conferences were held with staff members to assure the cooperation of all employees.

Instructions

Written instructions were distributed and explained in detail at these conferences (see pp. 381-385). To avoid confusion in interpretation, definitions used in the instructions conformed to those in the Mississippi daily report of activities with which all local health department personnel were familiar.

That the instructions seemed to be satisfactory to all concerned was indicated by the small number of requests for interpretation during the period of the study and by the apparent accuracy and completeness of the records.

Reminder notices were mailed to all depart-

ments immediately preceding each week of the study.

Daily Time Sheet

The daily time sheet was a single $8\frac{1}{2} \times 11$ -inch tumblehead form with space for recording time under specific activities. Space was provided for daily totals and for central office calculations. Illustrated (p. 382) is a sample of the recorded activities of a clerk-typist in a local health department.

The coding on the reverse of the sheet was performed in the central office. Sheets received from participants were processed as follows:

All sheets were checked against a master list of employees obtained from payroll records to assure completeness of return and to code budget and item numbers. This and other coded information for use of the key punch operator were recorded on the reverse of the sheet. Records for part-time employees were held separately, and an identifying code was placed on them for gang-punching.

Time on the daily sheets was summarized for each individual by weekly totals which were recorded on the sheet for each Monday. Although this process required additional clerical time, it provided a check of the total time recorded and also reduced the volume of punch cards. Errors up to 20 minutes were adjusted in the interrelated column. Sheets with greater discrepancies were returned for correction.

On the basis of experience, it was found that some clerical time could have been saved in the central office if the following changes had been made on the daily time sheet:

Printing of code numbers for activities in calculation space.

Provision of space on reverse side for employees to record budget and item numbers.

Use of 6-minute instead of 5-minute intervals in order to cumulate and to punch the time in hours and decimal fractions of hours instead of minutes.

Punch Card Preparation

A 16-column machine punch card was used on which the budget number was carried in columns 1-3; item number, 4-6; classification of position, 7-8; activity, 9-10; minutes, 11-14; and month, 15-16.

For each employee one card was prepared for each activity listed on the summary time sheet. It was possible, therefore, for as many as 15 cards to have been punched for each employee for a particular week although examination of the records for the first week showed the average to be about 6. It was felt, therefore, that less punching and tabulating time would be required in the procedure followed than if separate fields for each activity were designated on the same punch card. In addition, greater flexibility in tabulating was possible under this procedure.

Tabulations

Preliminary tabulations prepared at the end of each week were used in further checking the accuracy of recorded information and in studying seasonal variations which might determine the duration of the study.

Final tabulations were prepared showing the distribution of time by individual budget elements, by activity, and by classification of position. The budgets were separated into two groups in the tables so that time for central office and time for local health departments are shown separately. In the final tabulations, employees of the State tuberculosis sanatorium and of the rapid treatment centers were excluded because these institutions primarily provide inpatient care. Time reported by the division of vital statistics was omitted from the tabulations because this division is not supported by funds from categorical grants.

Interrelated Time Element

Of the total time, approximately 29 percent was recorded as interrelated, a category which included time spent in general services, leave, and other activities (see instructions) which are necessary to the operation of any public health program. Thus, it was felt that for purposes of studying individual budgets, interrelated time should be allocated to the specific activities by some arbitrary method.

For allocation of interrelated time, budgets were divided into three broad categories: local health departments, central office divisions, and central office supportive services. In the final distribution for local health departments, in-

Continued on page 385.

Mississippi State Board of Health Time Study

—Instructions—

Purpose

To provide a basis and method for the proper and equitable distribution of funds within the budgets of the State offices and cooperating local health departments, with particular reference to the so-called categorical grants covering such specialized activities as maternal and child health, venereal diseases, tuberculosis, heart disease, cancer, mental health, and so forth. It is necessary that the State board of health submit a plan for the next budget period which will justify the expenditure of these funds in the various departments which make use of these monies. This plan must provide satisfactory evidence that services are being rendered at least in proportion to the amount of categorical funds which are included within that budget.

In order to formulate a state-wide plan to meet this request, a comprehensive time study of the activities of all personnel in the State office and county health departments is necessary if we plan to continue at least the present level of health services in the State of Mississippi.

All personnel in the State and local subdivisions of the Mississippi State Board of Health are required to participate.

Explanation and Definition

1 The plan of the study will be as follows: Each worker will keep a daily time study for 1 complete week each month, starting at 8 o'clock Monday morning and continuing through the entire working week. A separate sheet will be filled out for each day through Friday and through the 4-hour work period on Saturday morning. County variations due to midweek closures and working all day Saturday will be adjusted according to the local arrangement. Each worker will be held accountable for a full $5\frac{1}{2}$ -day workweek. The workday will be on the basis of $7\frac{1}{2}$ hours.

2 In order to provide a sample that will take into account weekly as well as seasonal variations in

activities, the study will be kept by weeks as follows until further notice:

4th week in July, beginning Monday, July 23.

1st week in August, beginning Monday, August 6.

2d week in September, beginning Monday, September 10.

3d week in October, beginning Monday, October 15.

4th week in November, beginning Monday, November 26.

Then begin over again with the week of the first Monday in December and so on until the study period is completed. The occurrence of 5th weeks in certain months will be disregarded and not included in this sequence.

3 Every effort has been made to provide a simplified form for this study. The single daily sheet is made up of a heading for identification and coding purposes, followed by a time and an activity table for the period of 8-12 o'clock each day. Space is provided at the bottom of this page for adding the one-half day morning time totals which are to be carried over to the reverse side of the form which covers the afternoon work period from 1 to 4:30 o'clock. At the bottom of the reverse side, another line is provided for the time totals for the entire workday. The remaining space labeled "calculations for central office" is for central office tabulation purposes and is not to be filled out by the workers at either the State or local level.

(See reproduction of form on next page)

4 The vertical time breakdown of the sheet provides major hourly divisions, 15-minute subdivisions, and is finally further subdivided into 5-minute intervals. Therefore, all activities should be designated to the nearest 5-minutes' time insofar as possible. In showing activities of 15 minutes or less, place the symbol "x" in the center of *each 5-minute space* of the time so devoted. For activities exceeding 15 minutes, a vertical line may be drawn down through the center of the proper activity column. However, an "x" should be placed at

Daily time sheet—front and reverse

Name Jane Doe Department or
Divs on Blank Health Department
Payroll Classification Clerk-Typist - Field Date Monday, Feb. 18, 1952

ACTIVITIES															
TIME	ACUTE CD	TB	VD	CANCER	MATERNAL AND CHILD HEALTH				MENTAL HEALTH	HEART	ADULT HYG	IND HYG	SAN	WATER POL	INTER RELATED
					MAT	INF	PRES	SCHOOL							
8.00															
15															X
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	01	02	03	04	05	06	07	08	10			13		15	
	CD	TB	VD	CANCER	MAY	INF	PRES	SCHOOL	MH	HEART	AM	LM	SAN	WP	IR
CALCULATIONS FOR CENTRAL OFFICE (Do Not Fill In)	175	370	160	150	245	230	175	290		30			90		575
MISSISSIPPI STATE BOARD OF HEALTH															
7 1 51									TIME SHEET				ADM		

Instructions—Continued

the beginning and end of this line so that the exact time of the beginning and end of the service can be noted. For example, if a visit or activity takes 1 hour, an "x" is placed in the 5-minute interval or space that it begins, say at 10:15, and the other at 11:15 when it is completed. The line connecting the two time intervals will give the total time of 60 minutes devoted to this activity. This will simplify the recording of such activities that cover one-half day or all-day clinics, which are devoted strictly to one category. All activity time and totals will be designated in minutes to the nearest 5-minute interval.

5 The horizontal activity listing across the top of the page should be interpreted in the same manner as you code your daily activities for the quarterly tabulation of activities. However, it is assumed that all personnel concerned will use their own judgment in making honest estimates where multiple activities in the categories in question occur within a fixed work period such as a generalized conference or clinic wherein a nurse or health officer may see antepartum, infant, preschool, venereal disease, or tuberculosis patients. For example, in a general clinic or conference of 4 hours' duration, of 20 patients registered 10 were antepartum,

Instructions—Continued

5 infants, and 5 venereal disease, the breakdown of the 4 hours should be divided proportionately to service time devoted to those three activities.

- 6 a. *Name.* Use your official payroll name.
b. *Department or division.* Designate county health department or central office division.
c. *Payroll classification.* Use your official merit system classification which is on the payroll.
d. *Date.* Designate the day of the week and date. For example, Monday, July 2.

e. *Acute communicable disease.* Include all activities that would fall under section A of the tabulation of activities. Time devoted to immunizations in generalized clinics, school clinics, and so forth will be recorded here; also, school inspections for communicable diseases.

f. *Tuberculosis.* Include all activities in section C of the tabulation of activities. The taking of X-rays regardless of what type of clinic they are done in should be listed here. Clerical time in X-ray clinics, working with tuberculosis records or tuberculosis register, and so forth will be allocated to this column.

g. *Venereal disease.* Include all activities in section B of the tabulation of activities. Time estimated in taking of blood tests, or seeing patients relative to venereal disease in any type clinics whether it be maternal and child health, food handlers, and so forth will be coded to this column.

h. *Cancer.* Include time spent on special cancer clinics, on visits to cancer patients, special examinations, education, and so forth, in connection with State cancer control programs.

i. *Maternal and child health:*

1. *Maternity*—Include time covering those activities listed in tabulation of activities.
2. *Infant*—Include time covering those activities listed in tabulation of activities.
3. *Preschool*—Include time covering those activities listed in tabulation of activities.
4. *School*—Include time covering those activities listed in tabulation of activities.

j. *Mental health.* Include time spent in special clinics, home visits, and special examinations in connection with State mental hygiene program.

Lunacy hearings should also be coded in this section.

k. *Heart disease.* Include time spent in special clinics, home visits, and special examinations in connection with State heart disease control program.

l. *Adult hygiene.* Include here the items as included in section H of the quarterly tabulation of activities except service to cancer and heart patients which have a special column. General type food handler clinics will fall in this category.

m. *Industrial hygiene.* County personnel who are called on to do special industrial hygiene inspections, investigations, or surveys within their own county as a part of the State industrial hygiene service will code activities in this column.

n. *Sanitation.* In general the major part of the sanitation supervisor's activities as listed in the quarterly tabulation of activities section J will be reported here. Environmental typhus and malaria activities and other special projects, unless otherwise instructed, will also be coded here. When the sanitation supervisor renders service in acute communicable disease control, tuberculosis control, or other health activities with the health officer, nurse, and other members of the staff, these services should be carefully evaluated and credited to the proper category. The health officer, nurse, clerk, and other members of the staff will also use the sanitation column on occasions if their activities are evaluated in the field of sanitation.

o. *Water pollution.* There shall be recorded in this column all time devoted to water pollution control activities; that is, any work carried on by an individual relating to stream sanitation studies, investigations of existing municipal sewage or industrial waste treatment plants, investigations made for the purpose of securing the installation of a municipal sewage or industrial waste treatment plant, and activities related to removal of pollution from any streams, lakes, or coastal waters of the State. This includes time performed by any county sanitation supervisor individually or in company with a representative of the division of sanitary engineering.

p. *Interrelated.* This column should not be abused. Some general administrative items that will fall into this classification are contacts with boards and other officials unless the meeting is for a specific purpose; answering the telephone and meeting the public; preparing of financial reports; administrative correspondence; preparation of quar-

terly reports and narratives; preparation of personnel records and handling of personnel problems; preparation of leave requests; staff conferences for program review or planning; and conferences with lay groups or clubs unless a specific subject or talk is given.

Clerical time has been covered in some of the above listed administrative activities; however, when possible, specific work on certain records, such as immunization cards, tuberculosis records, venereal disease records, milk ledgers, and so forth, should be properly charged to the appropriate column. General indexing, checking and filing of daily reports, recording of laboratory data, vital statistics activities, and other programs that cover multiple health activities should be charged to the interrelated column.

General Remarks

1 Travel time. The time going to and returning from a particular activity, clinic, or series of home visits, or inspections, if they are in the same category, will be charged against it. However, in the instance of multiple home visits or inspections where the category or purpose may vary from visit to visit, going to the first premise will be charged to the purpose of that visit; between visit 1 and visit 2, to the purpose of the second visit; and so forth. The return time following the last visit of such a series will be charged to interrelated activity. Travel to and from an outlying mixed general type of clinic will be charged to interrelated.

2 Leave time. All leave time will be charged to interrelated activity.

3 Lost time. When a patient or individual is not located or not at home, this time will be charged to the planned activity or original purpose of the effort.

4 Overtime. No overtime will be coded. All activities will be limited to the hours of the official workday.

5 Preparation time and posting time. Such preparation for a clinic or visit will be charged against the major service given during this activity, or allocated proportionately to the time given to the specific activity.

6 Classes, lectures, movies, exhibits, and so forth. Code this time against the category you consider received the major interest during the activity.

7 Lunch hours. In many departments lunch hours are staggered. Since a 12-1 o'clock interval is not provided for coding worktime, bring the work period backward or forward as the case may be so that it is tabulated between 11-12 or 1-2. For example, personnel taking off for lunch from 11:30-12:30 will list the half hour 12:30 to 1 o'clock as occurring between 11:30 and 12:00. Morning and afternoon breaks for rest period should be charged to interrelated.

8 Special and part-time personnel. Label all part-time forms with notation P-T in parentheses by payroll classification.

a. *Health educators.* These activities are sufficiently diversified, so that careful evaluation should be given in coding their activity time properly according to the quarterly tabulation of activities.

b. *Laboratory workers.* This work falls principally into the fields of acute communicable disease control, venereal disease, tuberculosis, maternal and child health, and sanitation, with some specialized activities in certain areas in connection with shellfish control and stream pollution. Code accordingly.

c. *Veterinarians.* Both full- and part-time personnel will be included in the study. The major part of these activities will be coded under sanitation but on occasion certain activities if properly evaluated should be coded under communicable disease, such as rabies control or other epidemiological investigations.

d. *Nurses aides and clinic technicians.* Full-time, part-time or those working on an hourly basis will maintain their own study records.

e. *Dental hygienist and dentist.* This activity is primarily in the field of maternal and child health or school health. Dental hygienists will be held responsible for the reporting of all dental service time.

f. *Venereal disease investigator.* These activities will for the most part be coded under venereal disease control as listed in section B of the quarterly tabulation of activities. However, when taking part in other special projects, these should be accounted for under the proper category.

g. *Special administrative, special clerical, and part-time administrative or clerical personnel.* These are usually concerned with specific activities

or projects and should be coded as indicated. However, general service personnel in the above category can list their activities under interrelated unless otherwise instructed.

h. *Porters and maids.* Charge to interrelated unless employed for special purpose or special clinic.

Office Mechanics and Filing

1 Each person will be held responsible for the neatness, accuracy, and completeness of his own time study sheet. The daily time sheets will be kept by the individual concerned until all the sheets for the week are complete. Each worker will be responsible for *checking* the accuracy of the information and the time totals at the end of each daily sheet, which should be added horizontally across the column marked daily total. This total *will not be*

more nor less than 450 minutes for a full workday and will be 240 minutes for a half day.

2 On Monday of the week following the study, the completed forms in proper daily sequence will be turned over to the responsible health officer or secretary or clerk for checking their completeness and to see that all personnel in the department have been accounted for. The responsible health officer or clerk will *be sure to recheck the items* mentioned in paragraph 1, namely the accuracy of the heading and daily totals.

3 The forms for the entire department will be mailed or delivered to the division of county health work, arranged in daily sequence and properly separated by individuals for the entire week, so as to reach the division of county health work not later than 1 week after the end of the completed study week.

Continued from page 380.

terrelated time was distributed according to the percentage distribution of total identified time for all counties combined. In the central office, interrelated time for each division except for selected supportive services was distributed according to the percentage distribution of identified time in that division. Interrelated time in the supportive services—administration office, business office, statistical service, county health administration, personnel office, and merit system—was allocated according to the distribution of all identified time in the central office.

In future analyses, interrelated time reported by the division of vital statistics will be distributed on the same basis as that for the supportive services.

If the purpose of the study were expanded to include more detailed examination of program content, additional subdivisions might be used to account for major activities included in interrelated time, for example, sick and annual leave, and general administration.

Findings of the Study

The comparatively uniform distribution of activity time prompted discontinuation of the study after 8 sample weeks, 1 each in July–December (1951) and January and February

(1952). The number of employees varied only slightly during this period with the smallest number, about 795, in October and the largest number, about 810, in July. These employees reported 15,946,165 minutes—or 265,769 hours—for the 8 weeks.

Time Distribution

Final distribution of time and percentages for the various activities are shown in table 1. As was expected, there were wide variations in distribution both in the local health departments and in the central office. Because of the assignment to central office budgets of some employees who serve at the local level, venereal disease investigators and mobile X-ray personnel for example, time and percentage proportions in the central office for several activities exceeded proportions in local health departments.

The percentage distribution of time in local health departments by program activity and by personnel category is shown in table 2. In general, the time for medical, nursing, and clerical personnel was spread throughout all activities and did not show as much concentration as did the time for personnel classified as sanitation, dental, and health education.

individual health departments, but the wise administrator will investigate to find out why one department spent only 4.4 percent of its time on acute communicable disease and why another county spent 24.4 percent; why the range for venereal disease was from 3.1 to 24.0 percent and for sanitation, from 6.2 to 44.0 percent.

It is planned to make such tabulations of activities by counties available to the local health departments and to assign each county a tabulation number known only to itself.

Sampling Investigations

The percentage distributions of time in local health departments by activity for each week are shown in table 4. The relative uniformity in the last six sample weeks will be noted. In this study, average deviations from the total distribution were smallest during the first week in December and during the second week in September. Relatively small deviations also occurred during the second week in January, the third week in February, the fourth week in November, and the third week in October. It is likely that the larger variations which occurred during the fourth week in July and the first week in August were due to seasonal circumstances and not to the choice of week. Larger proportions of interrelated time were recorded in these months because of employee vacations. Also, relatively little time was assigned to school activities because few schools were in session.

Policies of the State board of health probably influence many of the variations. Examinations of school children are customarily made in October and November of each year, and the proportions in table 4 reflect this increased activity. Time spent on tuberculosis control varied in part because of reduction in mobile screening services during the fall months when equipment was undergoing repair. Immunizations and epidemiological investigations of acute communicable diseases increased the time spent on this category during the summer months. Venereal disease activity was highest during the first 3 weeks of the study in agreement with the increase noted in other venereal disease reports for this time

of the year. The variations in sanitation time were small and did not follow a trend. Since most time in this category was contributed by personnel assigned to sanitation, a relatively stable group, the slight changes may have occurred because of special sanitation activities performed by other personnel groups. The time for cancer activities was relatively high during the fall, especially in October, when many of the public health nurses attended in-service training courses in cancer.

Valid Sample Week

The distributions, especially uniform during the last 6 sample weeks, indicate that a reasonably accurate estimate of total local health department time could have been obtained if the study had been limited to any one of the last 6 sample weeks. From a practical standpoint, the second week in September would probably be the period of choice in Mississippi.

The weekly variations in the central offices were smaller than those in the local health departments, and any one of the 8 weeks would have furnished a satisfactory distribution of time.

Table 5. Mississippi time study: Distribution of time by activity for sample composed of every fifth local health department budget, and for all local health departments combined—8 weeks during July 1951–February 1952

Activity	13-county sample		All local health departments (percent)
	Minutes	Percent	
Total.....	1, 833, 980	100. 0	100. 0
Acute communicable disease.....	200, 839	11. 0	11. 2
Tuberculosis.....	194, 908	10. 6	10. 1
Venereal disease.....	192, 959	10. 5	9. 7
Cancer.....	26, 772	1. 5	1. 1
Maternal.....	269, 547	14. 7	13. 2
Infant.....	142, 624	7. 8	7. 6
Preschool.....	80, 343	4. 4	4. 4
School.....	212, 049	11. 6	11. 3
Mental health.....	13, 194	. 7	. 6
Heart.....	3, 437	. 2	. 2
Adult hygiene.....	44, 896	2. 4	2. 1
Industrial hygiene.....	7, 935	. 4	. 2
Sanitation.....	438, 931	23. 9	28. 0
Water pollution.....	5, 546	. 3	. 1

Size of Population

To check the validity of further sampling, the punch cards were sorted in terms of the local health department budgets. They were arranged in order of population size of the counties, and every fifth health department was selected. By this method, 11 county or district health departments were chosen including 13 of the 80 counties with full-time health departments and an aggregate population of 379,296, or about 18 percent of the State population served by local health departments.

Employee time in this group is shown in table 5. Some changes from the distribution for all departments will be noted, but the percentages for this sample furnished another estimate of activity distribution which may be adequate for practical purposes. This estimate, however, did not agree so closely as the single weeks in September, November, December, January, or February agreed with the total distribution.

The selection of the sample probably introduced some bias. Although this sample was based on population, and the rural-urban composition was approximately the same as for the entire State, the sample was somewhat weighted with nonwhites. However, this did not cause any apparent deviations in activity time.

The only consistent difference was in the proportion for sanitation activities. This percentage was lower in the selected counties than in the entire State for every week of the study, as a comparison of tables 4 and 6 will show.

Evidently, a sample of counties based on population size of counties does not provide a representative sample for sanitation activities since problems in this category are less likely to be directly related to the number of persons than in other categories. In this sample, for example, little shellfish sanitation, no military installations, and no high milk-producing areas were included, and consequently, important parts of the sanitation program were omitted.

The weekly distributions for this sample are shown in table 6. In these distributions, as in the total, the average deviations were highest during the fourth week in July and the first week in August and lowest during the other 6 weeks of the study. All these deviations are greater than those for single weeks for all employees and also for the 8 weeks combined for the sample group of counties. An estimate of activity time, however, could have been made from a time study of every fifth county according to population size for a period of only 1 week. And, further reductions in the sample could have been made. In the other samples

Table 6. Mississippi time study: Percentage distribution of time by activity by week of study for sample composed of every fifth local health department budget—8 weeks during July 1951—February 1952

Activity	Total	July, 4th week	August, 1st week	September, 2d week	October, 3d week	November, 4th week	December, 1st week	January, 2d week	February, 3d week
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Acute communicable disease.....	11.0	11.8	12.5	9.3	10.5	10.0	14.5	9.1	10.0
Tuberculosis.....	10.6	11.4	11.0	10.1	10.1	9.5	8.9	10.1	13.8
Venereal disease.....	10.5	11.9	11.5	12.6	9.7	9.1	10.3	9.8	9.6
Cancer.....	1.5	.8	1.1	.6	4.2	1.3	1.2	1.4	1.0
Maternal.....	14.7	15.5	16.8	15.8	12.9	14.6	13.7	15.9	12.9
Infant.....	7.8	7.8	8.3	8.7	7.5	7.9	7.1	7.7	7.4
Preschool.....	4.4	6.7	5.5	4.8	3.6	3.6	3.7	3.8	3.7
School.....	11.6	5.9	6.3	10.2	14.3	15.8	11.9	12.6	14.4
Mental health.....	.7	.8	.3	.5	.6	.9	1.1	.6	1.0
Heart.....	.2	0	0	.1	.3	.1	.2	.1	.6
Adult hygiene.....	2.4	1.9	2.2	1.8	1.9	2.4	2.3	4.6	2.3
Industrial hygiene.....	.4	1.7	.2	.4	.3	.1	.3	.4	.1
Sanitation.....	23.9	22.8	24.1	25.0	23.6	24.5	24.8	23.8	23.0
Water pollution.....	.3	1.0	.3	.2	.5	.2	.1	.1	.1

NOTE: Interrelated time in each week was distributed according to the distribution of identified time in that week.

illustrated here, some accuracy has been sacrificed; that is, the smaller the sample, the greater the error.

Of the four estimates of activity distribution shown, the most accurate is assumed to be the one based on total employees for the entire 8 sample weeks (table 2).

Summary and Conclusions

The Mississippi time study included all State and local health department employees for a period of 8 sample weeks. It produced with what is considered to be a minimum expenditure of time and effort the information for which it was designed: factual data for the justification of categorical grant expenditures; and information for crude evaluation of program activities.

On the basis of the crude evaluations of sev-

eral of the larger programs, there is evidence of the need for further study in these areas.

Analysis indicates that a reasonably accurate estimate of total time distributions could have been obtained if the study had been further limited in time to any 1 of the last 6 sample weeks. An estimate of activity distribution procured by limiting the study in area did not agree so closely with the total distribution as did the single weeks. However, even this variation is not necessarily great enough to preclude the use of smaller areas in studies of this kind. Apparently, a reasonably accurate estimate of time devoted to the various health department activities can be obtained from a study made on the basis of a relatively short period of time, probably without including the entire State and local staffs.

Public Health Service Staff Announcements

Dr. Louis L. Williams, Jr., a career officer of the Public Health Service since 1915 and chief of the Division of International Health since 1948, retired January 31, 1953. A specialist in malaria control research, Dr. Williams long directed Public Health Service malaria investigations. He served as field director of rural malaria control investigations in Virginia from 1921 to 1930 and was in charge of malaria studies at the National Institutes of Health from 1926 to 1940. Before World War II, Dr. Williams headed the malaria commission to China-Burma Highway, and at the war's start he organized malaria control in areas of camps and war industries. In 1943, he was detailed to the U. S. Army as malariologist in the Mediterranean Theater of Operations.

From 1945 to 1948, Dr. Williams was Public Health Service liaison officer to the Department of State, assisting in organizing its international health affairs branch. He was a member of the United States delegation to the International Health Conference, which in 1946 drew up the constitution of the World Health Organization. He also served as a delegate to the Pan American Sanitary Conference in Caracas in 1947 and as a member of the organizing committee, Fourth International Congress on Tropical Medicine and Malaria, in 1947.

Dr. H. Trendley Dean, director of the National Institute of Dental Research, National Institutes of Health, Public Health Service, retired April 1, 1953. A pioneer in research leading to the use

of fluoridated water to reduce dental decay in children, Dr. Dean made the discovery that people using fluoride drinking water had teeth that resisted decay. He has been a Public Health Service officer since 1921, and, in recent years at the National Institutes of Health he directed a broad program of investigation into the diseases of softening tissues, pyorrhea, and other oral conditions.

Dr. Dean's interest in the relationship of fluoride to dental caries grew out of his earlier work on mottled enamel. Dr. Dean was assigned in 1931 to determine where in the United States people drank water containing fluoride and how it caused dental fluorosis—mottled enamel. In 1942, after a study of 21 cities, he and his colleagues at the National Institutes of Health were able to determine that one part of fluoride to a million parts of water was sufficient to inhibit dental decay without causing fluorosis.

Dr. Francis A. Arnold, Jr., associate director of the National Institute of Dental Research since 1948, has been named as the new director. Dr. Arnold, who has been with the Public Health Service since 1934, has worked with Dr. Dean since the first studies on the relationship of fluoride to dental caries were made in 1937. He made the first report on production of carious teeth in hamsters, these animals having since become one of the principal experimental animals in this work.

Twenty Years of Followup Experience In a Long-Range Medical Study

By EUNICE RIVERS, R.N., STANLEY H. SCHUMAN, M.D., LLOYD SIMPSON
and SIDNEY OLANSKY, M.D.

ONE OF THE longest continued medical surveys ever conducted is the study of untreated syphilis in the male Negro. This study was begun by the Public Health Service in the fall of 1932 in Macon County, Ala., a rural area in the eastern part of the State, and is now entering its twenty-second year (1-4). This paper is the first report dealing with the nonmedical aspects of the study. The experiences recounted may be of value to those who are planning continuing studies in other fields.

In beginning the study, schedules of the blood-drawing clinics throughout the county were announced through every available source, including churches, schools, and community stores. The people responded willingly, and 600 patients were selected for the study—400 who had syphilis and, for controls, 200 who did not. The patients who had syphilis were all in the latent stage; any acute cases requiring treatment were carefully screened out for standard therapy.

Miss Rivers, a public health nurse with the Division of Venereal Disease, Public Health Service, is associated with the Macon County Health Department, Tuskegee, Ala. Mr. Simpson is a venereal disease field investigator for the Public Health Service in Region VI. Dr. Schuman is with the clinical investigations section of the Venereal Disease Research Laboratory in the Communicable Disease Center, Chamblee, Ga., and Dr. Olansky is director of the laboratory.

At Tuskegee, each of the 600 patients initially was given a complete physical examination, including chest X-rays and electrocardiograms. Careful histories were taken and blood tests were repeated. Thereafter, each of the patients was followed up with an annual blood test and, whenever the Public Health Service physicians came to Tuskegee, physical examinations were repeated.

There have been four surveys: in 1932, 1938, 1948, and 1952. Between surveys contact with the patients was maintained through the local county health department and an especially assigned public health nurse, whose chief duties were those of followup worker on this project. The nurse also participated in a generalized public health nursing program, which gave her broad contact with the families of the patients and demonstrated that she was interested in other aspects of their welfare as well as in the project. The nurse was a native of the county, who had lived near her patients all her life, and was thoroughly familiar with their local ideas and customs.

A most important phase of the study was to follow as many patients as possible to post-mortem examination, in order to determine the prevalence and severity of the syphilitic disease process. Cooperation of patients with this plan was sought by offering burial assistance (through a private philanthropy, the Milbank Memorial Fund) on condition that permission be granted for autopsy. For the majority of these poor farmers such financial aid was a real boon, and often it was the only "insurance" they

could hope for. The Federal Government offered physical examinations and incidental medication, such as tonics and analgesics, but was unable to provide financial assistance on a continuing basis. The Milbank Memorial Fund burial assistance made it possible to obtain a higher percentage of permissions for post-mortem examinations than otherwise would have been granted.

Transportation to the hospital for X-rays and physical examination was furnished by the nurse. Her car was too small to bring in more than two patients at one trip; therefore, two men were scheduled for examination in the morning and two for the afternoon. During the early years of the study, when the county was strictly a rural one, the roads were very poor, some being impassable during the rainy season. Very often, the patients spent hours helping to get the car out of a mudhole. Now, with modern conveniences (telephones, electricity, cars, and good roads) the nurse's problems are fewer than in the early days.

Having a complete physical examination by a doctor in a hospital was a new experience for most of the men. Some were skeptical; others were frightened and left without an examination. Those who were brave enough to remain were very pleased. Only one objection occurred frequently: the "back shot," never again! There are those who, today, unjustifiably attribute current complaints (backaches, headaches, nervousness) to those spinal punctures.

Followup

The patients have been followed through the years by the same nurse but by different doctors. Some doctors were liked by all the patients; others were liked by only a few. The chief factor in this was the length of time doctor and patients had to get to know each other. If the doctor's visit to the area was brief, he might not have time to learn and to understand the habits of the patients. Likewise, the patients did not have an opportunity to understand the doctor. Because of their confidence in the nurse, the patients often expressed their opinion about the doctor privately to her. She tried always to assure them that the doctor was a busy

person interested in many things, but that they really were first on his program.

It is very important for the followup worker to understand both patient and doctor, because she must bridge the gap between the two. The doctors were concerned primarily with obtaining the most efficient and thorough medical examination possible for the group of 600 men. While they tried to give each patient the personal interest he desired, this was not always possible due to the pressure of time. Occasionally, the patient was annoyed because the doctor did not pay attention to his particular complaint. He may have believed that his favorite home remedy was more potent than the doctor's prescription, and decided to let the whole thing go. It then became the task of the nurse to convince him that the examinations were beneficial. If she failed, she might find that in the future he not only neglected to answer her letters but managed to be away from home whenever she called. Sometimes the doctor grumbled because of the seemingly poor cooperation and slowness of some of the patients; often the nurse helped in these situations simply by bridging the language barrier and by explaining to the men what the doctor wanted.

Sometimes the nurse assisted the physician by warning him beforehand about the eccentricities of the patients he was scheduled to see during the day. For example, there was the lethargic patient with early cancer of the lip who needed strong language and grim predictions to persuade him to seek medical attention. On the other hand, there was the hypochondriac who overheard the doctor mention the 45° angle of rotation of his body during the X-ray examination; the next day, the entire county was buzzing with gossip about their remarkable friend who was "still alive, walking around with his heart tilted at a 45° angle."

Following a group of patients in a specialized field over a period of years becomes monotonous to patient and nurse, and both could lose interest easily. For the patients, the yearly visits by the "Government doctor," with free medicines, revived their interest. The annual blood tests and the surveys were always scheduled at "slack" times, between fall harvest and spring planting. The patients congregated in groups at churches and at crossroads to meet the nurse's

car in the morning. As the newness of the project wore off and fears of being hurt were relieved, the gatherings became more social. The examination became an opportunity for men from different and often isolated parts of the county to meet and exchange news. Later, the nurse's small car was replaced with a large, new, Government station wagon. The ride to and from the hospital in this vehicle with the Government emblem on the front door, chauffeured by the nurse, was a mark of distinction for many of the men who enjoyed waving to their neighbors as they drove by. They knew that they could get their pills and "spring tonic" from the nurse whenever they needed them between surveys, but they looked forward happily to having the Government doctor take their blood pressure and listen to their hearts. Those men who were advised about their diets were especially delighted even though they would not adhere to the restrictions.

Because of the low educational status of the majority of the patients, it was impossible to appeal to them from a purely scientific approach. Therefore, various methods were used to maintain and stimulate their interest. Free medicines, burial assistance or insurance (the project being referred to as "Miss Rivers' Lodge"), free hot meals on the days of examination, transportation to and from the hospital, and an opportunity to stop in town on the return trip to shop or visit with their friends on the streets all helped. In spite of these attractions, there were some who refused their examinations because they were not sick and did not see that they were being benefited. Nothing provoked some of the patients more than for a doctor to tell them that they were not as healthy as they felt. This attitude sometimes appeared to the examining physician as rank ingratitude for a thorough medical workup which would cost anyone else a large amount of money if sought at personal expense. At these times the nurse reminded the doctor of the gap between his education and health attitudes and those of the patients.

When a patient asks the nurse for help because he is a "Government patient" and she explains there are no funds for this, he may point out that he needs assistance while he is living, not after he is dead. Whenever the nurse

A Career in Nursing Service

Miss Rivers knows her patients well. She was born in Georgia and has lived in that vicinity her entire life. After graduation from the Tuskegee Institute School of Nursing in 1922, she joined the Alabama State Department of Health. There she was assigned to the bureau of maternal and child welfare where she helped farmers and their wives in the rural areas of Alabama with problems of home nursing and home hygiene. In a later assignment with the Alabama bureau of vital statistics, she assisted midwives in problems of rural nursing and in their vital statistics reports. After 8 years of work for the State, she returned to Tuskegee to be night supervisor of the John A. Andrew Memorial Hospital.

In 1932, Miss Rivers was offered a position as night supervisor in a New York general hospital. She chose, instead, to stay in Alabama as a scientific assistant with the Division of Venereal Disease of the Public Health Service. Miss Rivers still holds this position, in which she cooperates with the physicians and contact investigators on the Tuskegee untreated syphilis study. She also is the contact worker with the venereal disease control program in addition to assisting in the general nursing service of the Macon County Health Department.

Among her deepest convictions is the belief that rural areas desperately need good and sympathetic nurses to participate in and carry out effectively public health programs, as well as private medical care. She feels very strongly, on the basis of her own experience, that the girl who is trained in nursing in a rural area is much more likely to live and practice nursing in that area. Miss Rivers feels that, had she taken the offer to go to New York City many years ago, she probably would never have returned to the people with whom she is so familiar and for whom she feels she now can do her small part to contribute to better health and advances in public health.

heard this complaint, she knew that there was danger of a lost patient. She appealed to him from an unselfish standpoint: What the burial assistance would mean to his family, to pay funeral expenses or to purchase clothes for his orphaned children. Even though a large number wished they might derive more benefits

from being "Government patients," most of them answered the call to meet the doctor, some willingly, others after much persuasion.

The study group was composed of farmers who owned their homes, renters who were considered permanent residents, and day laborers on farms and in sawmills. The laborers were the hardest to follow. Some of the resident farmers traveled to other sections seeking work after their own crops had been harvested, but they came back when it was time to start planting. An effort was made continually through relatives to keep informed of the patients' most recent addresses, and this information regularly has been placed in their records. During the 20 years of the study, 520 of the original 600 men have been followed consistently if living, or to autopsy. It is possible that some of the 80 now considered lost will at some time return to the county or write the nurse from distant places for medical advice.

Autopsies

The excellent care given these patients was important in creating in the family a favorable attitude which eventually would lead to permission to perform an autopsy. Even in a friendly atmosphere, however, it was difficult for the nurse to approach the family, especially in the early years of the project, because she herself was uneasy about autopsies. She was pleasantly surprised to receive fine response from the families of the patients—only one refusal in 20 years and 145 autopsies obtained. Finally, the nurse realized that she and not the relatives had been hesitant and squeamish.

Sometimes the family asked questions concerning the autopsy, but offered no objections when they were assured that the body would not be harmed. If the patient had been ill for a long time and had not been able to secure any relief from his symptoms, they were anxious to know the reason. If he had died suddenly, they were anxious for some explanation. They also feared that some member of the family might have the same malady, and that information learned from the autopsy might aid them. Now, after many years, all of the patients are aware of the autopsies. When a member of "Miss Rivers' Lodge" passes, his sur-

living colleagues often will remind the family that the doctor wants "to look at his heart." Autopsies today are a routine; neither nurse nor family objects.

One cannot work with a group of people over a long period of time without becoming attached to them. This has been the experience of the nurse. She has had an opportunity to know them personally. She has come to understand some of their problems and how these account for some of their peculiar reactions. The ties are stronger than simply those of patient and nurse. There is a feeling of complete confidence in what the nurse advises. Some of them bring problems beyond her province, concerning building, insurance, and other things about which she can give no specific advice. She directs them always to the best available sources of guidance. Realizing that they do depend upon her and give her their trust, she has to keep an open mind and must be careful always not to criticize, but to help in the most ethical way to see that they get the best care.

Conclusions

Experience with this project has made several points clear which may benefit anyone now engaged in planning or executing a long-range medical research study:

1. Incentives for maximum cooperation of the patients must be kept in mind. What appears to be a real incentive to an outsider's way of thinking may have little appeal for the patient. In our case, free hot meals meant more to the men than \$50 worth of free medical examination.

2. The value of rapport and sympathy between patient and physician, and between patient and nurse or followup worker never can be overestimated. Material incentives can merely supplement and support a basic feeling of good will. A kind word is often worth a carton full of free medicines. A single home visit is worth more than a dozen letters on impressive stationery.

3. Changes in key personnel over the years in a long-range project can seriously weaken the project by upsetting continuity and familiar routine. It is not amiss to start a long-

range study with young personnel who should then be around for the conclusion of the project. On the other hand, some new personnel may bring fresh ideas and energies to a lagging effort.

4. Teamwork between all members of the research staff is essential: doctor, nurse, investigator, technicians, and clerks all must work together for a common goal. They must appreciate the importance of each other's efforts to the success of the whole.

5. As difficult as it may be to maintain patient interest and personnel efficiency in a long-term study, there is still the advantage of momentum which gathers slowly but increasingly, until patient cooperation becomes so routine as to be habitual. Difficulties often can be anticipated due to previous experience, and thereby avoided.

6. The gains to medical knowledge derived from the horizontal, long-term study of illness and health are only just beginning to be real-

ized. As public health workers accumulate experience and skill in this type of study, not only should the number of such studies increase, but a maximum of information will be gained from the efforts expended.

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Annual Symposium on Venereal Diseases

The annual symposium on Recent Advances in the Study of Venereal Diseases, sponsored by the experimental therapeutics study section of the National Institutes of Health, Public Health Service, will be held at the Federal Security Building in Washington, D. C., April 30 through May 1, 1953. The symposium will take place in conjunction with the 15th annual session of the American Venereal Disease Association.

All scientific workers interested in this field, including biologists, physicians, representatives of industry, epidemiologists, and public health nurses, are invited to attend. Further information may be obtained from Dr. Frederick W. Appel, executive secretary, experimental therapeutics study section, National Institutes of Health, Bethesda 14, Md., or from Dr. John C. Hume, secretary, American Venereal Disease Association, 615 N. Wolfe Street, Baltimore 5, Md.

Child Health Day

May 1, 1953

In the quarter century since President Coolidge issued the first Child Health Day Proclamation, through new medical and scientific discoveries and extensive public health work, our country has made tremendous advances in overcoming many of the great physical hazards which used to threaten children.

In the words of President Eisenhower, "We are now striving to make equally significant progress in understanding the nature of emotional health, in order that our children may grow into mature, responsible citizens of a democracy."

We know that children who do not get the chance to develop their fullest capacities in each stage of their growth run larger risks of growing into maladjusted, unhappy, and not fully productive adults.

All along the way we see evidence that the knowledge we have about child growth is not being fully applied. We see it in mounting juvenile delinquency rates, in a fantastically large national crime bill, in mounting numbers of emotionally disturbed, mentally ill people.

There is nothing that leads us to believe that people are born juvenile delinquents or criminals. And it is in their childhood that tendencies in these directions first appear.

If, as parents, we can understand more about the growth processes of childhood, we increase the chances that our children can develop the emotional and mental strength required to live happy, useful, and satisfying lives.

OVETA CULP HOBBY

Secretary, U. S. Department of Health, Education, and Welfare

A PROCLAMATION

By the President of the United States
Of America

WHEREAS the Congress, by a joint resolution of May 18, 1928 (45 Stat. 617), authorized and requested the President of the United States to issue annually a proclamation setting apart May 1 as Child Health Day; and

WHEREAS the health and wholesome development of our children are matters of the deepest concern to all Americans; and

WHEREAS the stresses and strains of our times create many problems bearing on the spiritual and emotional health of our children and are reflected notably in juvenile delinquency; and

WHEREAS we have made tremendous advances in overcoming the most severe physical hazards of childhood, and are now striving to make equally significant progress in understanding the nature of emotional health, in order that our children may grow into mature, responsible citizens of a democracy:

NOW, THEREFORE, I, DWIGHT D. EISENHOWER, President of the United States of America, do hereby designate the first day of May, 1953, as Child Health Day; and I urge all parents and young people, and all other individuals, as well as agencies and organizations interested in the well-being of children, to increase their understanding of the emotional, social, and spiritual growth of children, so as to apply this understanding in their day-to-day relations with the rising generation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.



DONE at the city of Washington this 20th day of February, in the year of our Lord nineteen hundred and fifty-three, and of the independence of the United States of America the one hundred and seventy-seventh.

DWIGHT D. EISENHOWER.

Maternal and Child Health Services

—Challenges and Aims—

By LEONA BAUMGARTNER, M.D., Ph.D.

MATERNAL and child health activities, which had their beginnings far, far back in human history, have grown through the years with the technological advances and the changing social attitudes of the times. It is no more possible to predict exactly what direction they will take in the future than it would have been 25 years ago to outline today's program. Nor is the making of specific predictions a wise procedure, for public health programs must be flexible to allow for the inevitable social and technological changes. However, it is possible and it is wise to chart some sort of course for the future. An examination of the existing situation in maternal and child health—the achievements that have been made and the problems still to be solved—provides a basis for suggestions for future action.

Maternal and Infant Mortality

The greatest and most obvious achievement has been the saving of lives of infants and moth-

Dr. Baumgartner has been associated with the New York City Department of Health since 1937 and now as assistant commissioner directs its maternal, child, and school health services. In 1945 she was adviser to the French Ministry of Health, and in 1949-50 she served as associate chief of the Children's Bureau, Federal Security Agency. She is a member of the faculty of the Cornell University Medical College and of the Harvard School of Public Health.

This paper is based on material presented at the 48th annual New York State Health Conference at Lake Placid, June 1952.

ers. Since 1915, the infant death rate among registered births in the United States has decreased 67 percent for the first year after birth, 80 percent for the second through the twelfth month, 52 percent for the first month, and 31 percent for the first day.

Fetal deaths too seem to have decreased. At least, the number of fetal deaths after 28 weeks of gestation now equals the number of neonatal deaths. Progress has also been made in saving the prematurely born, among whom the death rate has declined about 33 percent since 1915. Maternal death rates have dropped phenomenally, 85 percent since that date.

Despite these successes, fetal, neonatal, and maternal deaths year after year constitute the third or fourth largest group of deaths among the total population. Much more needs to be known about how to prevent these deaths, and much more needs to be done to put into practice what is already known. It is discouraging to see, for example, that although fewer mothers die as a result of childbearing, they still die largely of preventable causes—hemorrhage, infection, toxemia.

The infant death problems are now primarily centered around deaths at or near birth. The strong probability that certain groups in the population give rise to a large proportion of the fetal and neonatal deaths indicates these groups as one place in which activities should be concentrated. The medical factors leading to pregnancy wastage obviously need further elucidation, but it should not be forgotten that the social and economic factors also may be important.

A specific area in which additional knowl-

edge is needed is deaths of premature infants, which constitute about two-thirds of all infant deaths. Although intensive study in the past two decades has developed methods of saving the lives of these infants and large programs for their care have been inaugurated, the lack of information on how to prevent premature labor has so far precluded the establishment of a truly preventive program.

Child Health and Rehabilitation

A second noteworthy achievement is the improved health of children after infancy. The communicable diseases are largely under control, with enormous reductions in the mortality, morbidity, and crippling they once caused. In fact, so successful have been the efforts in this direction that accidents now kill more children from 1 through 15 years of age than disease.

Much still remains to be done, however. Little knowledge exists, for example, as to where or how to begin to solve the accident problem. And conditions which formerly received little or no attention—such as epilepsy, congenital heart disorder, cerebral palsy—can now be attacked.

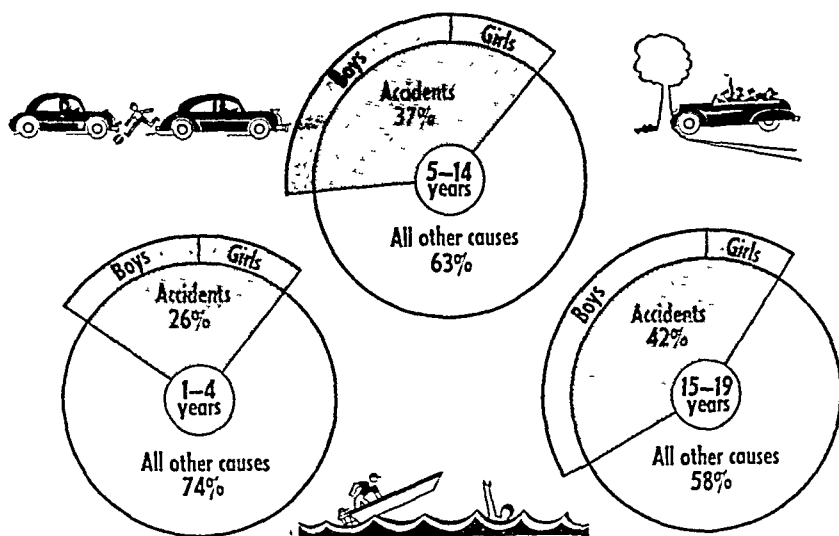
Rehabilitation of children with handicaps or chronic diseases presents many problems. The public must be willing to support the community-wide activities of case finding, diagnosis, and therapy that are essential if maximum rehabilitation is to be secured for all. These ac-

tivities are usually complicated, demanding the cooperation of more than one professional group. Few communities have so organized their resources as to make them easily available on an inclusive basis. Very real experimentation must be undertaken if all children are to have the services they need for full utilization of their assets.

Further, rehabilitation activities are not always undertaken in accord with the expectation of greatest results. Public demand seems largely to have decided what was to be done. For example, few communities have attempted to establish rehabilitation of the epileptic child, even though it appears possible to improve the condition of over 80 percent of epileptic persons at relatively little cost.

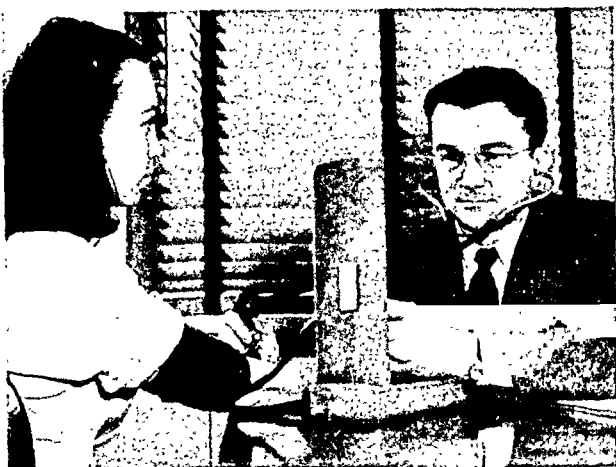
Promotion of Health

A third achievement is the enormous body of specific knowledge about the physical, mental, and emotional growth and development of children obtained through research during the past four or five decades. Research has provided many, apparently unrelated facts indicating how children differ from adults and from each other. Physical growth seems to proceed in a more or less orderly fashion according to a general pattern, but within this pattern each individual proceeds at his own pace and in his own way. A pattern is evident, too, in emotional and behavior development. Permeat-



Accidents

are the greatest hazard in the lives of children. In 1948—the year on which the chart data are based—16,000 persons under 19 were killed by accidents. And the number of deaths tell only part of the story. Many more thousands of children were handicapped by accidental injury.



Good medical and nursing care throughout pregnancy—with supportive instructional and educational programs for parents before and after delivery—and the provision of good hospital facilities means the saving of thousands of babies and mothers. Achievements in reducing maternal deaths have been impressive,

ing the conclusions drawn from studies of all types is the concept of “readiness,” that is, that the most successful attempts to train a child, to modify his behavior, are those which are timed to coincide with an appropriate stage of his development.

Particularly important for the public health expert are the clues as to the kinds of experience and environment which promote or retard optimal growth of the individual. These clues can be considered as hints for carefully planned epidemiological studies. The control of typhoid fever, for example, came after the lead provided by the Broad Street pump incident almost 100 years ago. Surely the environment can and should be controlled to promote the health of the child in other ways, and the process may well lead to results as spectacular as those achieved through improved environmental sanitation.

Social and Economic Factors

Certain economic and social factors which affect families and children should also be considered. Although these factors are not usually given attention by the medical and public health professions, they are certainly not re-



reflected in all three major causes—infection, toxemia, hemorrhage—a result largely of prenatal care plus hospital deliveries. Yet even now 1 out of 3 Negro babies is born with no medical attendance, and the needs today are greatest among Negro mothers and mothers living in rural areas.

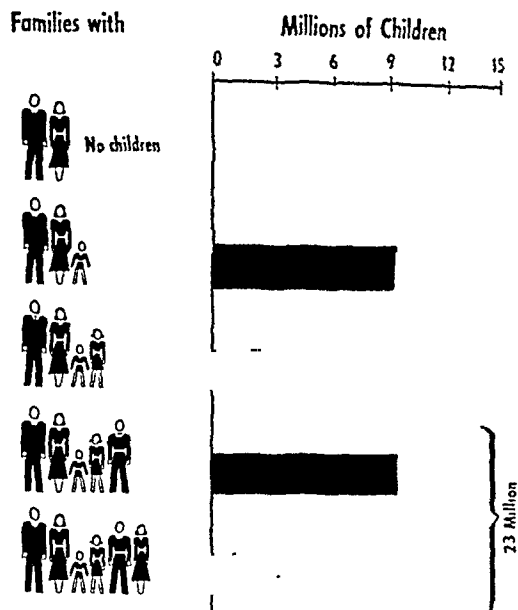
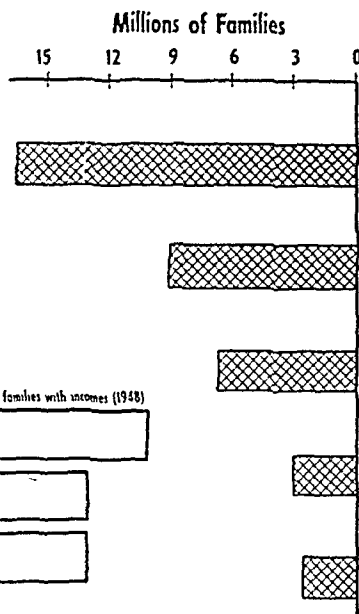
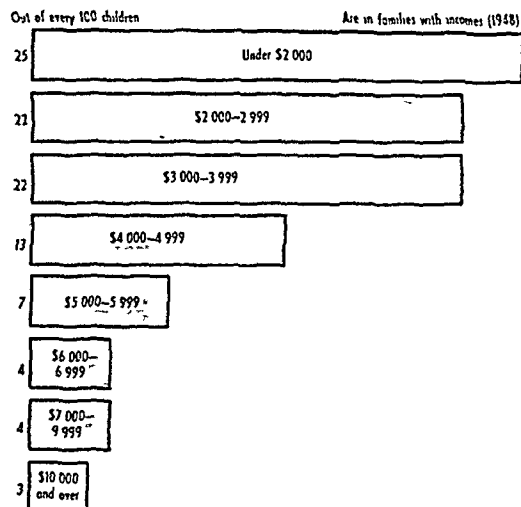
mote from the problems confronting these professions and others interested in making the most of what medicine and public health have to offer. Five important factors deserve discussion. Figures given are derived almost entirely from the 1950 census.

Population Growth. The population is actually growing younger faster than it is growing older. In the last decade, the number of children under 5 years increased 55 percent while persons over 65 years increased only 37 percent. During the next two decades, the number of school-age children and adolescents will increase substantially. This increase in the number of children will necessitate additional child health activities just to provide the same services available today.

Younger Parents. Couples are becoming parents at a younger age today than they did in past generations. One-third of the females in 1950 were under 20 years of age at marriage, and the median age of marriage has declined ever since 1890. Parents are, however, better educated, with some 4 years more schooling than the generations born in 1890. Therefore, though they do not come to child-bearing with many of the specific skills and knowledges formerly acquired in the large families of yes-

Family Size and Income

In 1949, 15 percent of the Nation's 39 million families had 3 or more related children under 18 years—a total of some 23 million, or about half of all children under 18. More than



half of the families with 3 or more children and almost two-thirds of those with 5 or more live on farms or in rural-nonfarm areas. Over two-fifths of the total number of families had no children under 18, some because their children had grown up, some because of recent marriage. About 30 percent of families with related children have 2 children, and about 40 percent have only 1 child under 18 years. The chart at left indicates that most children are in low and moderate income families. Also, most large families have lower incomes than small families.

terday, parents probably can be counted on to do more themselves for their children if shown how.

Economic Status. One-half of the children live in families with three or more children, and about one-half live in families with an income of less than \$60 a week. In general, the larger the family, the smaller the income. Children are concentrated, too, in relatively few families, with 16 percent of all families caring for 61 percent of all children. Because married couples become parents at a younger age than formerly, they earn less in the years when their children are young. These facts lead to the conclusion that most of our future citizens are being brought up in families in which it usually is not possible for the family alone to provide all of the health services advised.

Family Stability. In recent years great stress has been placed on how much the health and stability of the adult depend upon the support of a stable, secure family during his early years. Bowlby (1) has recently reviewed evidence

showing the positive relationship between early maternal care and later mental health. These figures then may be significant: One out of 8 children in the United States lives in a home that does not have 2 parents or does not live in a family at all; 1 out of 5 mothers works away from home; children born out of wedlock have increased 50 percent within the last decade, with a total of 135,000 such births occurring in 1949, 30,000 of these to girls under 17 years of age.

Chances for Survival. The chances for survival and the quantity and quality of medical and dental care received by children vary widely in different parts of the country and in different economic groups. The recent American Academy of Pediatrics study (2) indicates that the child's very chances for survival depend upon where he lives and who his parents are. It shows, too, that doctors, even from good medical schools, have too little opportunity to learn modern pediatrics and that there are definite needs for better distribution of health and medical services and for more and better

professional education at undergraduate and graduate levels.

These are some of the problems of maternal and child health in the United States today. Great progress has been made and significant leads have been obtained as to where to go in the future, but because of the lack of scientific knowledge in certain areas and the uncertainty as to how best to proceed in others, a great deal of uncharted sea lies ahead.

Suggestions for Action

Although the public health program for the future cannot, of course, be laid down in specific terms, the following general suggestions warrant consideration.

Research

A greatly augmented program of research into the problems of human reproduction and the growth and development—physical, mental, and emotional—of children is needed. Such a program requires the development of one or more institutes directed to the study of human beings. An institute of this type should have on its staff research persons from many fields: anatomy, obstetrics, genetics, pediatrics, statistics, embryology, physiology, chemistry, physics, and the social sciences. Among the problems lending themselves to immediate attack are



Successful attacks against many of the "common" childhood diseases have cleared the way for more aggressive approaches to some of the more stubborn problems—cerebral palsy, epilepsy, rheumatic fever, congenital heart defects, poliomyelitis.

the causes of death and malformation at or near birth and the accident problem. The apparent increase of mental illness and maladjustment also indicates further study is needed to verify or disprove the leads which the mental health movement is developing concerning personality growth.

Evaluation

A second point of attack is the development of more critical evaluation studies of ongoing services. Some of the maternal and child health programs are a half century old. Are they still meeting a public health need? If not, they should be terminated. If so, methods used and results obtained should be studied to determine if these programs are as effective as they could be.

Take, for example, school health services. The one study of the past few years that probably has had the greatest influence in this field is the so-called Astoria study (3). It attempted essentially to answer one simple question: "How can the time now spent by teacher, doctor, and nurse in the school be spent more productively?" This question needed answering and the result undoubtedly has increased the efficiency of many school health services. But in



Homemaker services provided in many communities—sometimes under health department auspices—represent an important contribution to family health and child security at times when the mother is ill or temporarily disabled.



Nowhere in the country are there enough foster homes, residential treatment centers for emotionally disturbed children, or other facilities for specialized types of care. The lack is most acute outside metropolitan areas.

the light of the enormous sums spent in school health activities and the changes in the nature of the health problems of today's children, other questions need answering. Is any of the school health service time worth spending? Are there other more effective ways of locating children in need of medical care? And what are the really effective ways of securing care for those who need it? In short, what are the real health needs of today's school children?

To evaluate ongoing services will not be easy. Methods are often still to be developed. There is little tradition for such research, and few investigators are trained for or interested in this approach.

Service Coordination

A third approach is the coordination of current activities for the promotion of the child's health when he is well with those for his care when he is sick or chronically ill. Certainly, the practice of caring for the child in one clinic when he is well and in another when he is sick is not justified administratively nor is it satisfying to the family. All children need sound advice about health care and growth and development as well as specialized care for their particular ailments.

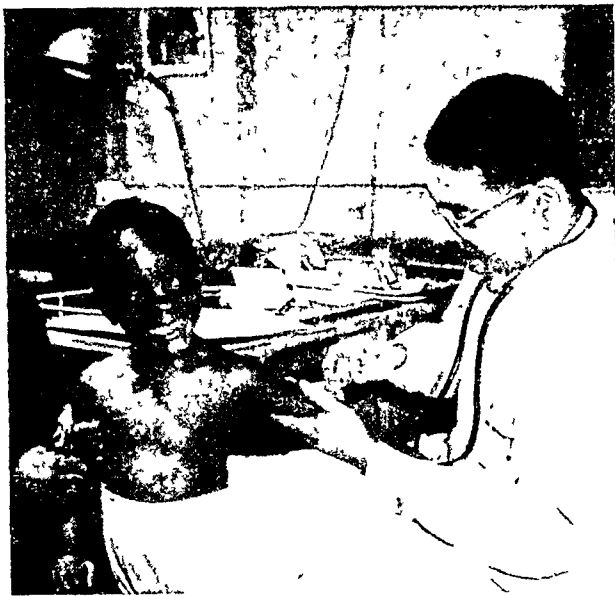
Many of the current child health problems seem to require a team approach—for example, the rehabilitation of the child with cerebral

palsy, a severe hearing loss, or rheumatic fever. Isn't there some way of promoting a closer working relationship between public health personnel and the general practitioner, without whom many of the past achievements could not have been made? Wouldn't it be possible to work out an agreement whereby the general practitioner's patients could be helped by the public health nurse, nutritionist, and similar persons? Certainly, experiments can be made to determine the feasibility of providing, in one geographic location and with as far as practical the same staff, all the health services a particular child needs.

Social Science Approaches

The fourth approach should be an attempt to use more effectively some of the findings of social scientists. They stress, for example, the use of community groups having a common interest in the solving of problems which demand changes in behavior. The therapeutic value of groups such as Alcoholics Anonymous or parents of children with cerebral palsy or diabetes has been demonstrated. Why shouldn't the value of work with groups of parents of 6-month-old or 2-year-old children be tested? Attempts in this direction have been made and seem to confirm the opinion that this type of group approach has great potentialities.

Failure to focus on the whole family in a human kind of way has characterized many of our efforts in the past. The effective care of the child is a complicated process involving, particularly in early years, all the family and more than good physical care. For example, maternity care has often been interpreted as the maintenance of a complicated piece of machinery located in the female pelvis. Certainly this approach has saved thousands of lives. But hasn't something needlessly been lost in the meantime? The birth of a child is a natural function and involves all the members of the family. The recent swing to a more human approach to the expectant mother and the newborn infant in this country should be a matter of rejoicing among all public health workers. A better foundation for family life is thus being built, with no loss in effectiveness of lifesaving measures. Years ago that remarkable experiment at the Peckham Health



Well child care provides an opportunity to promote the emotional as well as the physical health of children. But too few children get health supervision when they are not sick. Children living in the South and in isolated counties get far less care from physicians in private practice than children elsewhere. Children living in metropolitan counties receive one-third of their care from pediatricians and other specialists, but children in isolated counties get very little service of this kind. Less than one-tenth of the well child care is given at clinics, and most clinics are held in metropolitan counties.

Center demonstrated the value of bringing the whole family in on health problems of the individual in the family (4).

Possibilities for Progress

Finally, new ways of bringing to more people the benefits of medicine and public health need to be developed. Part of the picture, as previously pointed out, involves economic problems, but there are other problems too, some relatively simple and solvable today.

For example, why is there such a wide variation in the maternal and neonatal mortality rates and in quantity and quality of maternal and infant care in the same area? Recent studies in one large urban area where well-trained physicians and nurses are found in all hospitals show startling differences in practices (5, 6). With hemorrhage a leading cause of maternal death, is it really interference with the practice of medicine to insist, for example, that all hos-

pitals have blood readily available in the delivery room? Is it too much to require that anesthesia in the delivery room or gavage feeding in the premature nursery be given by persons who have been especially taught the techniques? Hospitals were long ago compelled to eliminate cross connections in plumbing and to drop silver nitrate in the eyes of newborn babies.

Why, despite all the evidence indicating the value of maternal care in early infancy and its relation to mental health in later life, isn't something more concrete done to provide continuity of maternal care for infants? Gains in emotional stability may be made by keeping children in their own homes instead of placing them in institutions. Much greater efforts should be made in this direction. Consider, for example, the commonly accepted practice of private and public agencies of paying more per day for the care of a child in an institution than in a foster boarding home, or the reluctance of these agencies to pay for homemakers or housekeepers to enable parents to keep children in their own homes. Is it practical not to tackle more effectively also the problem of care for the 135,000 children born annually to unwed mothers?

Individual Action

These are but a few examples of approaches to existing problems. Many of the problems await concerted action over a long period of time, and many require action which the individual health worker cannot initiate by himself. But each worker, as he performs his day-to-day tasks, can initiate action directed toward the goals suggested above.

He can, for example, reexamine his current activities to see if he is directing his major efforts toward those which apparently add to the physical, mental, and social well-being of those he serves. He can attempt to look at his daily job from a "new approach," exploring the possibilities of trying out a better way of doing the job or learning what persons of allied professions have to offer. He can add the human touch to his relations with those he serves. He can remain flexible, for the future of child health and public health lies in the ability of its

personnel to remain flexible and creative so that they can adapt new knowledge to old problems.

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Charts with this paper are adapted from: *Children and Youth at Midcentury*—a chart book, issued by the Midcentury White House Conference on Children and Youth and published and distributed by Health Publications Institute, Inc., Raleigh, N. C.

Children's Bureau Reports 1951 Adoptions

Nearly half the children adopted in 1951 by persons not related to them were placed in adoptive homes without the safeguards that both the children and parents should have, according to the Children's Bureau, U. S. Department of Health, Education, and Welfare. Forty-eight percent of children adopted by nonrelatives were placed into the adoptive home independently of a social agency.

The Children's Bureau report on adoptions in 1951 was prepared from data furnished by State public welfare agencies, on the basis of which the Bureau estimates that probably 80,000 adoption petitions were filed during the year. This is a 60-percent increase over adoption petitions filed in 1944.

The report attributes the increase in adoptions to the large number of homes broken by death, divorce, or desertion during and following World War II, and to the increase in the number of children born out of wedlock.

The average age of the children for whom adoption petitions were filed was 3.3 years in the 25 States reporting substantially complete information for 1951. Two-fifths of the children were under 2 years of age at the time the adoption petition was filed.

In independent placements, more than half of the children were under 1 month of age at the time of placement. This means that many of these children were placed either directly from the hospital or shortly thereafter. Only 11 percent of the children placed by agencies were under 1 month.

In the 25 States reporting complete information on adoption petitions, the number of adoptive children was almost equally divided between those born out of wedlock and those born in wedlock. Non-related persons filed adoption petitions for 69 percent of the adoptive children born out of wedlock but only 25 percent of those born in wedlock.

Cardiovascular Syphilis

In a General Medical Clinic

By S. P. LUCIA, M.D., VERNON C. HARP, JR., M.D.,
and M. L. HUNT, M.P.H.

Cardiovascular involvement is one of the more important manifestations of late syphilis, producing marked physical incapacity and a high accidental mortality. Diagnosis is often difficult, which is important, because the type and amount of therapy are dependent upon the degree of cardiovascular involvement.

The study here reported was undertaken to determine the incidence of cardiovascular syphilis in an outpatient department of a general medical clinic, the types of lesions most commonly encountered, and the age groups most frequently affected.

The group studied was made up of 830 patients referred to the Luetic Cardiovascular Clinic by the Clinic of Dermatology and Syphilology, University of California Medical Center. During the 12-year period, 1939-51, 2,273 of the total of 274,782 patients seen at the medical center were referred to the Clinic of Dermatology and Syphilology because they had either a history or serologic tests indicative of syphilis. The 830 patients in this study were in turn referred to the Luetic Cardiovascular Clinic, where 354 were found to have cardiovascular syphilis and 187 were found to have other cardiovascular disease (table 1).

Most of the patients with cardiovascular syphilis (310, or 87.7 percent) were over 40 years old; 213 were in the age group 41-60; 97 were over 61; only 44 were aged 21-40 (table 2). Aneurysm was the most frequently observed lesion in the older age groups, 48.4 and 67 percent, respectively; simple aortitis was found in 47.7 percent of the younger group. It is prob-

able that in the older age groups the syphilitic process has been present longer, thus increasing the possibility of involvement of the heart as well as other organs.

Of the 354 patients with cardiovascular syphilis, 91 (25.7 percent) had simple aortitis; 180 (50.8 percent), aneurysms; 42 (11.9 percent), aortic insufficiency; and 41 (11.6 percent), a combination of aneurysm and aortic insufficiency (table 3).

Diagnosis

In the Luetic Cardiovascular Clinic, the cardiovascular history, results of the physical examination, and conclusions drawn from a fluoroscopic examination, which represented an agreement between the various members of the examining staff, were recorded on a standard form. Examinations of the patients were made at intervals of 3, 6, or 12 months as the situation required. These examinations served as a check on the previous findings and also permitted detection of any progress in the disease process. From the data obtained, the diagnosis of cardiovascular disease was made;

Table 1. Incidence of cardiovascular syphilis in 2,273 patients referred to the Clinic of Dermatology and Syphilology and in 830 patients further referred to the Luetic Cardiovascular Clinic

Type of cardiovascular disease	Patients referred to Luetic Cardiovascular Clinic		Percent of 2,273 patients referred to Dermatology and Syphilology Clinic
	Number	Percent	
Total.....	830	100	36.5
Syphilitic cardiovascular disease.....	354	42.7	15.6
"Other" cardiovascular diseases ¹	187	22.5	8.3
No evidence of cardiovascular disease.....	289	34.8	(?)

¹ Rheumatic heart disease, 7 cases; congenital heart disease, 1 case; arteriosclerosis and hypertension.

² This group represents only that portion of the 830 individuals originally suspected of having involvement of the heart and therefore cannot be statistically evaluated in relation to the total 2,273 patients.

Dr. Lucia is professor of medicine and chairman of the subdepartment of preventive medicine, Dr. Harp is clinical assistant in medicine, and Miss Hunt is a graduate research immunologist at the University of California School of Medicine, San Francisco.

Table 2. Age distribution of 643 seropositive patients, by presence or absence of syphilitic cardiovascular disease

Diagnosis	Total	Age groups				
		Under 40	41-50	51-60	61-70	Over 70
Total.....	643	184	198	158	87	16
Cardiovascular syphilis.....	354	44	107	106	81	16
No evidence of syphilitic cardiovascular disease.....	289	140	91	52	6	0

opinion as to its activity, severity, and progression was given; and a plan of therapy was recommended.

Recognition of syphilis of the cardiovascular system depends upon the detection of weakness in the walls of the aorta. Chest pain, cough, dyspnea, or hoarseness, a broadened area of dullness at the base of the heart, unilateral pulse weakness, and a tambour quality of the aortic second sound all suggest syphilitic cardiovascular disease. An aortic diastolic murmur is of positive diagnostic significance since it is usually associated with a widened pulse pressure and it may be accompanied by the peripheral signs of aortic insufficiency. Although aortic insufficiency may follow advanced arteriosclerosis, the peripheral signs of aortic insufficiency, in such instances, may be minor or absent.

A fluoroscopic examination is the most reliable method of detecting cardiovascular syphilis in its early stages, and a series of fluoroscopic examinations provides the best indication of the progression and severity of the disease. The earliest positive sign of aortitis is a definite broadening of the ascending aorta. By serial examinations, progressive enlargement, sacculatation, and fusiform dilatation of the aorta are revealed. Fusiform dilatations of the ascending aorta are not invariably due to syphilis, but are more frequent when this disease complicates the usual changes caused by arteriosclerosis and hypertension. Fusiform aneurysms are usually, but not necessarily, due to syphilis, while saccular aneurysms are almost always the result of syphilitic aortitis.

In our experience, calcification in the wall of the ascending aorta is most often consequent to syphilitic invasion; in the wall of the abdominal aorta it is usually the result of arteriosclerosis, and in the thoracic aorta or aortic knob it may be due to arteriosclerosis alone. Calcification occurring exclusively in the ascending aorta indicates that the sclerotic changes are more marked because of the antecedent syphilitic inflammation.

Age Groups Affected

In table 2 the age distribution of 354 individuals who were diagnosed as having cardiovascular syphilis is compared with the age distribution of 289 individuals in whom no evi-

Table 3. Incidence of syphilitic cardiovascular lesions, by age

Lesion	Total		Age (years)						
	Number	Percent	21-30	31-40	41-50	51-60	61-70	71-80	81+
Total.....	354	100.0	7	37	107	106	81	14	2
Simple aortitis ¹	91	25.7	5	16	40	22	7	1	0
Aneurysm.....	180	50.8	0	12	43	60	53	11	1
Aortic insufficiency.....	42	11.9	2	7	14	13	4	1	1
Aneurysm and aortic insufficiency.....	41	11.6	0	2	10	11	17	1	0

¹ Simple aortitis refers to a broadened aorta, usually associated with a systolic murmur and a hollow aortic second sound, and often with symptoms due to these changes. It specifically excludes patients with aneurysms or aortic valve insufficiency.

Table 4. Incidence of syphilitic cardiovascular lesions, according to character of the lesion

Lesion	Number	Age (years)					
		21-40		41-60		61-80+	
		Number	Percent	Number	Percent	Number	Percent
Total.....	354	44	100. 0	213	100. 0	97	100. 0
Simple aortitis.....	91	21	47. 7	62	29. 1	8	8. 3
Aneurysm.....	180	12	27. 3	103	48. 4	65	67. 0
Aortic insufficiency.....	42	9	20. 4	27	12. 7	6	6. 2
Aneurysm and aortic insufficiency.....	41	2	4. 6	21	9. 8	18	18. 5

dence of cardiovascular disease was found. The incidence of syphilitic cardiovascular lesions, by age, is shown in table 3.

Incidence of Lesions

The lesions which were considered to be the result of syphilitic invasion of the cardiovascular system were simple aortitis, aneurysms, aortic insufficiency, and aneurysms and aortic insufficiency combined.

In the group of patients with simple aortitis due to syphilis associated symptoms such as aortic systolic murmurs or a hollow quality to the aortic second sound were also present. There were no instances of aortic insufficiency, aneurysm, hypertension, or gross arteriosclerosis of the aorta in this group. Aneurysms were present in 221 (62.4 percent) of the patients, and in 41 of these the aneurysm was accompanied by aortic insufficiency. On auscultation, insufficiency of the aortic valve was revealed in 83 (23.4 percent) of the patients, and in 42 of these there was no fluoroscopic evidence of an aneurysmal dilatation of the aorta.

Types of Lesions

In table 4 the data are arranged by age groups and according to the character of the lesion. In the light of the present day concept of the pathological changes in syphilitic aortitis, the first assault on the aorta would lead to a simple inflammatory process with broadening of the aorta and advance to the production of

aneurysms with or without involvement of the aortic valve itself. Accordingly, a greater incidence of simple aortitis would be expected in the young subject suffering from syphilitic cardiovascular disease and with increasing years an augmented incidence of aneurysm. A comparison of the incidence of simple aortitis in three age groups (table 4) reveals a statistically significant decrease in the occurrence of simple aortitis with advancing age and a statistically significant increase in the incidence of aneurysms. Aortic insufficiency occurred according

Table 5. Aneurysms of the aorta, by site of the lesion

Location of aneurysm	Number	Percent
Total.....	254	100. 0
Ascending aorta.....	211	83. 1
Transverse aorta.....	14	5. 5
Descending aorta.....	29	11. 4

to the statistically expected frequencies in each of the three age groups studied.

Of the 221 patients with aneurysms due to cardiovascular syphilis, several had more than one aneurysm—a total of 254 (table 5). Most of the aneurysms (211) were in the ascending aorta, 29 were in the descending aorta, and 14 in the transverse aorta. Of the patients who had aneurysms of the transverse or descending aorta without involvement of the ascending aorta, 4 were in the age group 41-60, and 6 were in the age group 61-81+.

Conclusions

In the diagnosis of cardiovascular syphilis it is important (a) to make a systematic evaluation of the symptoms and physical signs suggestive of the disease. (b) to subject the patient to serial fluoroscopic examinations to determine the presence or absence of aortitis, and (c) if

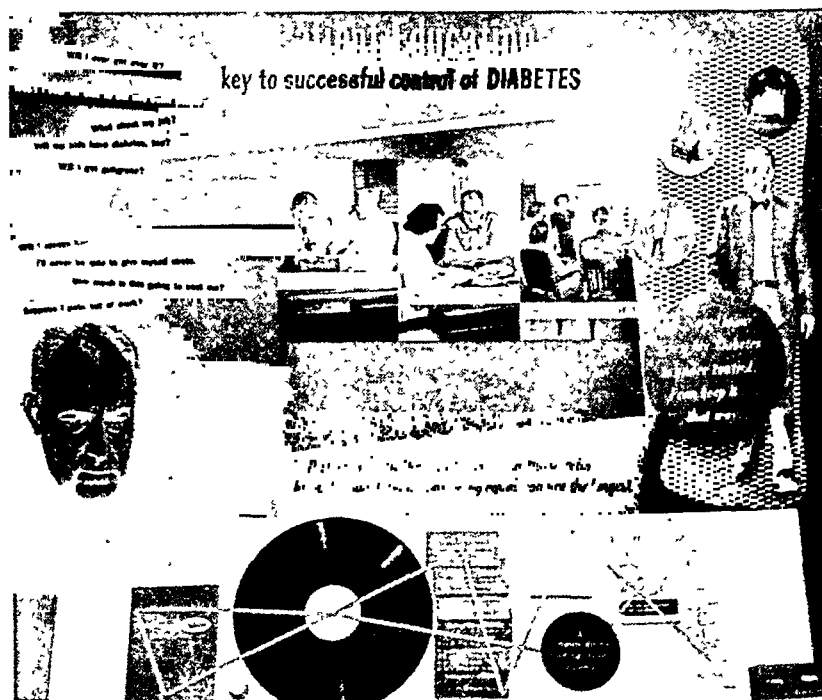
lesions are detected, to assess the rate of progression of the disease. Data obtained from such examinations are of value in deciding whether further therapy might introduce a hazard, especially in the advanced age group where hypertension, arteriosclerosis, and other evidences of degeneration of the cardiovascular system may coexist.

Diabetes Exhibits Available to Professional Groups



"Look for diabetes," is the theme of the Public Health Service exhibit (left) displayed at the 1952 annual meetings of the American Medical Association and District of Columbia Medical Society. The exhibit is 12 feet wide and 5 feet deep and weighs 250 pounds.

"Patient education, key to successful control of diabetes," (right), a Public Health Service exhibit, depicts control measures for diabetes. The lower panel displays some components of a kit of filmstrips, records, posters, and pamphlets which may be used by clinics, professional personnel, and public health workers for teaching diabetic patients. (Inquiries on how to obtain the kit separately from the exhibit should be addressed to your State health department.) The exhibit was first shown at the New England Health Institute, Storrs, Conn., and then at the annual meeting of the American Diabetic Association in Minneapolis in 1952. The exhibit is 6 feet wide and weighs 250 pounds.



Official agencies and voluntary organizations may borrow these exhibits for showings to professional audiences. The borrower, however, must pay the cost of transportation and insurance, both ways. Inquiries concerning the availability of the exhibits should be addressed to the Division of Chronic Disease and Tuberculosis, Public Health Service, Washington 25, D. C.

Public Health in Indonesia

By E. ROSS JENNEY, M.D., M.P.H.

IN THE NEW NATION of Indonesia, the principles of sound public health practice are being cross-examined and evaluated in relation to some of the most involved problems to be considered by one nation at one time. It is fascinating to observe, for some astute minds are being challenged to find a practical answer to what becomes, as one lives with it, a complex of conundrums. Most of the Indonesian officials who are responsible for making decisions have a local background plus an education in Western medicine and public health methods. This fortunate circumstance insures a realistic compromise with nicely budgeted programs nurtured in lands of economic affluence, but at the same time provides a dissatisfaction with the slow development of preventive medicine in the East.

A Nation of Islands

Although the Republic of Indonesia is but one of several nations born from the partial collapse of colonialism in Asia, its problems and advantages are such as to place it in a rather unique position in regard to future planning, particularly in public health. The nation

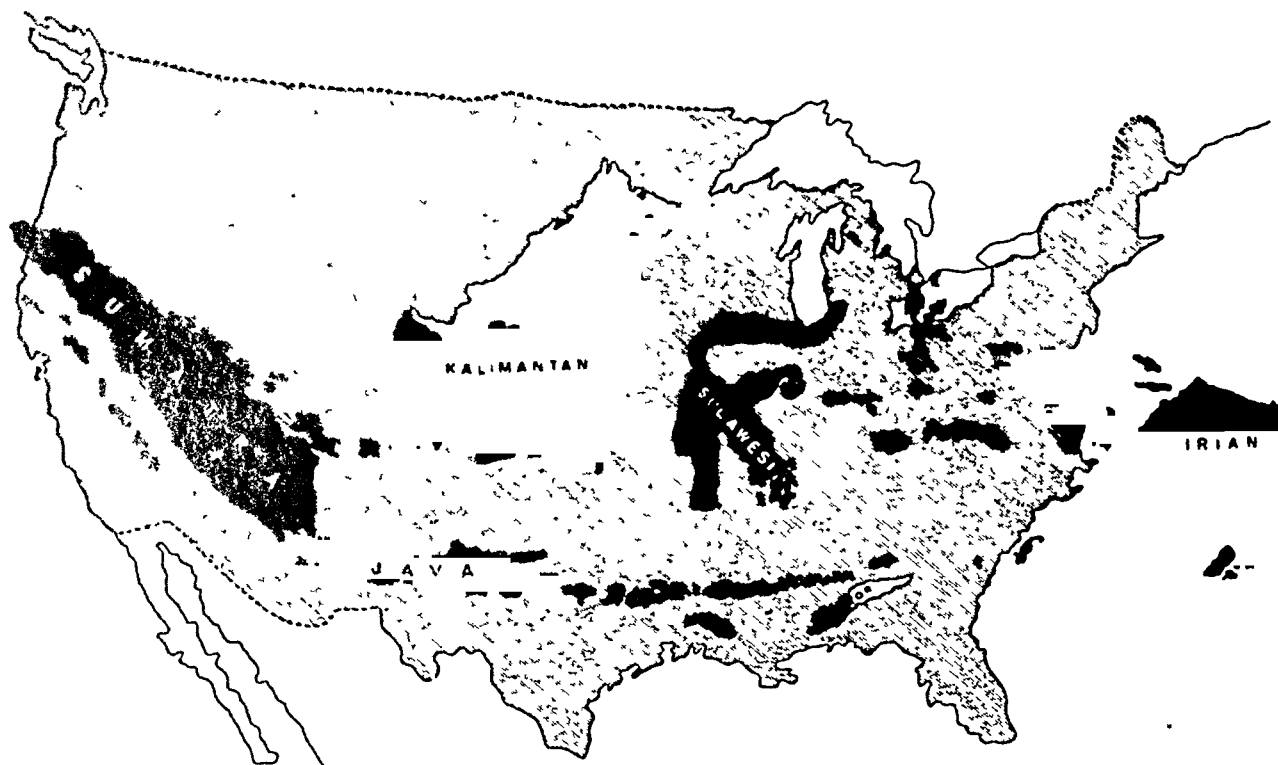
holds sovereignty over the former Netherlands East Indies, comprising Sumatra, Java, Borneo, Celebes, some 25 smaller satellites which except for Bali and Ambon are scarcely known to the world by name, and 13,000 interspersed small islands of which 2,600 are populated. Jurisdiction of the western half of New Guinea (Irian) is in dispute. Indonesia is, then, a nation composed solely of the world's largest archipelago with a land area of 750,000 square miles stretching across an equatorial area of 3,500 by 1,500 miles. If the northern tip of Sumatra were at New York, New Guinea would lie across North Africa.

Population Characteristics

Living on these islands is an unevenly distributed population of about 75 million. Java, with 52 million people and 51,030 square miles, has 70 percent of the population and only 7 percent of the land area. This is equivalent to one-third of the population of the United States living in the State of Florida. Density of population in Java averages over 1,000 per square mile. Since much of the island contains the sloping terrain of 50 volcanoes, the population density per square mile in some areas is approximately 1,700—the greatest rural population density in the world. In contrast to this, Borneo, the third largest island in the world, has a population density of about 14 per square mile.

The inhabitants of Indonesia are of Malay descent. The Chinese merchant is everywhere and with the Europeans, Arabs, and Indians forms a minority population of perhaps 2,500,000. Although many languages are used, comprising over 200 dialects, the language is being unified by promulgating "Bahasa Indonesia,"

Dr. Jenney has returned to Washington, D. C., from a 2½-year assignment as chief of the public health division of the Technical Cooperation Administration Mission to Indonesia. Before entering the Public Health Service as a commissioned officer in 1949, he served as chief of public health of military government in Bavaria (1946-48) and chief of public health, Allied Mission to Norway (1944-45). His earlier career included an assignment to Labrador with Sir Wilfred Grenfell's mission.



Indonesia superimposed on the United States. The Republic of Indonesia, lying between the land masses of Asia and Australia, is a nation composed solely of the world's largest archipelago stretching across an equatorial area of 3,500 by 1,500 miles.

which is similar to the variety of Malay spoken in the Riouw Archipelago near Singapore. The religions of the Indonesians are derived from the Hindu kingdoms of the seventh and eighth centuries and the Mohammedan infusion in the thirteenth and fourteenth centuries. Hinduism survives in Bali, but over 90 percent of the Indonesians are Moslem. The areas not strongly Moslem at the arrival of the Europeans have been more susceptible to conversion to Christianity, notably the island of Ambon, the northern tip of Celebes, and the area around Lake Toba and Medan in Sumatra.

Climate

Although the climate of the river bottom lands is tropical in every sense, the mountains, which rise to peaks commonly 10 to 12 thousand feet, provide a range of climate that is quite agreeable. The coastal cities of Java have a climate comparable to our own eastern cities in summer, and a blanket at nighttime is usually needed in the mountain towns.

Except for the more arid Lesser Sunda

Islands, the entire archipelago is carpeted in tropical vegetation, from the coastal swamp lands to the slopes of the volcanoes. In Java, this has given way to agriculture, chiefly in the form of the famous terracing for the rice paddies, and to the agricultural plantations of the Dutch.

Exports

Although the 3½ years of Japanese occupation, subsequent military actions, and other factors have compromised the export situation, before World War II Indonesia provided 37 percent of the total world's export of rubber, 19 percent of tea, 27 percent of copra, 24 percent of palm oil, 91 percent of quinine, 86 percent of pepper, 72 percent of kapok, 25 percent of hard cordage fibers, 3 percent of petroleum, 17 percent of tin, 5 percent of sugar, and 4 percent of coffee. Of the total export value, 30 percent was in rubber, 21 percent in petroleum, 13 percent in copra and palm oil, 11 percent in tin, and the balance in sugar, tea, and other products.

The exports in 1950 in order of importance

were rubber, petroleum, tin ore, copra, tobacco, tea, and palm oil. The chief consumer countries were the Netherlands, the United States, Singapore, the United Kingdom, Germany, Japan, and Australia.

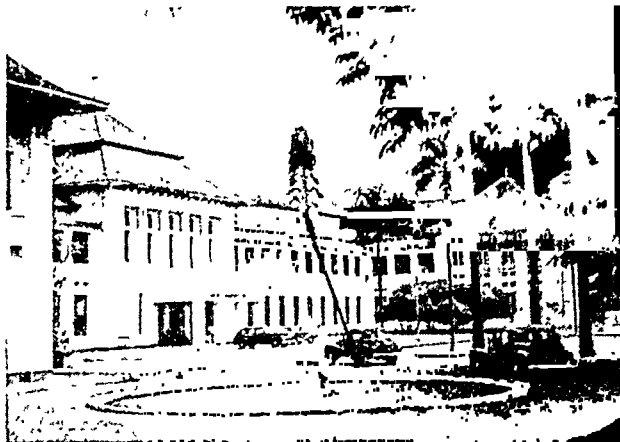
In contrast to its extraordinary beauty and its potential wealth, Indonesia carries a heavy burden of poverty, ignorance, and disease. The individual subsistence level farmer dominates the agricultural pattern, and the rapid increase in population implies a questionable future for Java. Literacy is estimated at 17 percent. Since this is largely in the urban areas, the rural population of 65 million is nearly illiterate.

The Health of 75 Million

Studies predicated upon limited surveys indicate a birth rate of 28 and a death rate of 20 to 25 per 1,000 a year. Maternal mortality is estimated to be in the neighborhood of 16 per 1,000 live births, and infant mortality varies from 115 to 300 per 1,000 live births a year but has been shown to be higher in some areas. Life expectancy scarcely can be guessed, but the figure of 32 years is commonly used.



Javanese returning from market. Human excreta is disposed of almost exclusively in the sluggish canal ("kali") on the right, which is also used for bathing and for washing vegetables and clothes. Indonesians, who have a highly developed sense of personal cleanliness, have been slow to appreciate the values of modern sanitation.



Associated with the Medical School (above) of the University of Indonesia in Djakarta (Java) is a modern 1,200-bed general hospital. At this school, one of the three medical schools in Indonesia, 25 students were graduated in 1951.

Malaria

Indonesia is one of the world's great endemic areas of malaria. Carried by both fresh and salt water *Anopheles* which breed throughout the year, the disease is common almost everywhere in the archipelago. In coastal areas, where incidence is apt to be high, the spleen index is frequently 90 percent or more. The incidence by attacks for each year, as in most of Southeast Asia, is estimated at 30 percent, and the annual mortality ranges from 20 to 40 per 1,000 in endemic areas of high incidence. In severe epidemics, records have shown 40 percent of the afflicted population dying from malaria within a year. Malaria certainly causes more deaths in Indonesia than any other disease and has a profound effect upon the economy of the country and upon mortality from diseases with which it occurs concurrently. Tertian and estivo-autumnal forms of the disease are in about equal proportions, with scattered areas of quartan forms in the Lesser Sunda Islands.

Tuberculosis

As in most tropical areas, tuberculosis is impossible to evaluate in statistical terms. There are at least half a million open cases, and it is known to constitute a major cause of death, perhaps 8 to 10 percent of the total. Limited surveys have shown the mortality rate to be 189 per 100,000 a year, but it is probably much

higher. There can be no doubt that a postwar increase in the disease occurred and that it will be many years before a quantitatively adequate approach to the problem can be devised. In the meantime, living conditions are contributing to the spread of tuberculosis, and it will probably emerge as the most difficult of all health problems.

Other Diseases

Typhoid fever, the paratyphoids, both bacillary and amebic dysenteries and the common diarrheas are extremely widespread throughout Indonesia. War damage and the increase in population contribute to their spread in rural areas, and recent overcrowding severely taxes urban sanitary facilities.

Yaws is found in proportions ranging from 5 percent to 90 percent and averages perhaps 15 percent; it is probable that there are 12 or 15 million cases. It is generally conceded that half of the world's cases of yaws are in Indonesia.

Filariasis has a variable incidence in different islands. It is particularly prevalent on the east coast of Sumatra, in Banka, in the Moluccas, and in the two southern peninsulas of Celebes.

Tropical typhus occurs in most of the islands except Java, and dengue is everywhere. Pneumonia is a common cause of death, particularly in infants. There is an occasional threat of cholera, but the disease must be considered eradicated. After very extensive control measures, plague now appears only sporadically, chiefly in mountain areas of Java. However, as recently as the first half of 1951, there were 2,861 cases and 1,185 deaths reported in Java and Madura. Smallpox has been nearly eradicated at various times but occurs at intervals by reintroduction. Following World War II there were widespread epidemics because the previous extensive vaccination program lapsed during the Japanese occupation. A recent introduction of smallpox from Singapore was traced from Sumatra to Java where it rose to epidemic proportions in West Java in 1948 and resulted in a severe epidemic in 1950 and 1951 in Surabaya. After spreading through eastern Java and Bali and reaching nearby Madura, it was carried by the Madurese fishermen to west and

south Borneo and from there to the Gulf of Bone in Celebes and to Ambon.

Leprosy, trachoma, and leptospirosis are all widespread, with an incidence corresponding to that found in most tropical countries. There are about 70,000 lepers in the nation. Rabies is common among dogs, in West Java particularly. Tetanus neonatorum is a frequent cause of infant mortality, especially in Celebes. Scabies is almost universal with frequent secondary infections. Tropical ulcers, tinea infections, and other tropical skin diseases are everywhere. Hookworm is widespread in the population, with perhaps a 50-percent prevalence in much of Java and 80 percent in the northern and southern peninsulas of Celebes. *Ascaris* infestation is almost universal, and other forms of helminthiasis abound. The rural prevalence of venereal disease is unknown, but there are indications that it affects not less than 10 percent to 20 percent of the population in urban areas.

Indonesia shares with the rest of Asia the unexplained freedom from yellow fever in the presence of the mosquito vector. Leishmaniasis is rarely encountered and is always imported, and schistosomiasis has been found only in a limited area of central Celebes at the base of the northern peninsula.

Malnutrition

The actual degree of malnutrition is relative matter in the tropics and is difficult to evaluate. Indications are that most of the inhabitants are living in a borderline state of malnutrition in regard to vitamins, protein, calcium, cholesterol, and iodine. Clinical cases of nutritional deficiency are observed to some degree everywhere and in a high degree in certain areas, particularly in conjunction with postmalarial anemia. Endemic goiter is frequently seen in the mountains of Sumatra, Celebes, Bali, and elsewhere, and edema caused by lack of protein is not uncommon.

Of the vitamin deficiencies, the lack of vitamin A is by far the most predominant, contributing to much eye infection and subsequent blindness. Kidney and bladder stones, possibly connected with a lack of vitamin A, are common, and in some hospitals 10 percent of all pediatric surgery is for this condition.

The Ministry of Health of the Republic of Indonesia is responsible for almost all medical and public health services in the nation. It is a highly centralized system working toward decentralization. It has assumed the functions of the former Netherlands East Indies Public Health Services, operates and staffs government hospitals and polyclinics, and controls most of the distribution of medical supplies and equipment. The present organization of the ministry dates from August 17, 1950. Earlier, there was a separate ministry of health at Djogjakarta.

Before the war, there were 207 general hospitals in Java and Madura, with a capacity of 19,022 beds (0.39 beds per 1,000 population). In addition, there were privately owned hospitals, missionary hospitals, and the medical facilities of plantations, petroleum companies, and so forth.

The Ministry of Health reports that in all of Indonesia there are now 600 general hospitals with 55,000 beds and 78 special hospitals and sanatoriums with 11,204 beds. The government owns about 35 percent of all hospital space, but a large part of the remainder is under some form of subsidy.

In 1942, there were 1,700 polyclinics operated by the Netherlands East Indies Public Health Service of which only 500 were in continuous daily use. Only the most important of these clinics were visited daily by a physician. The remainder were usually staffed by specially trained male nurses known as mantris, who frequently were not able to visit each clinic more than once a week. A polyclinic is usually in a small building in the jungle or a room in some community building. Industrial companies, plantations, and estates were charged by law with the care of their laborers. Hence, a close collaboration now exists between the Ministry of Health and these companies.

Before the war the number of physicians was 1,600. Owing to the exodus of many Dutch physicians, there are now fewer than 1,400 physicians in Indonesia, and perhaps no more than 1,000 are actually practicing medicine. This gives a ratio of 1 practicing physician to 75,000 population, which is undoubtedly one of the



Market scene in Bali. The island lies east of Java in the Lesser Sunda Islands, which include Lombok, Sumba, Sumbawa, Flores, and Timor. Population density on Bali averages about 600 per square mile.

lowest in the civilized world. Because of the urban concentration of physicians, the rural ratio is often one physician to several hundred thousand population. No less than 20 percent of the nation's physicians are in Djakarta. An offer of government contract service has recently brought a number of European doctors to Indonesia.

Medical Schools

There are three medical schools in Indonesia. The medical school at Djakarta was founded in 1851. The medical school at Surabaya

was founded in 1913. The medical school at Djogjakarta was founded in 1915. The first two are definitely class A institutions by European standards except for the unfortunate loss of faculty and some destruction and looting of equipment during the Japanese occupation. The institution at Djogjakarta is functioning under handicaps but is not compromising its objective of high standards. A fourth medical school is being planned under local auspices at Medan, Sumatra. There are indications that the medical courses may be reduced from 7 to 5 years.

The combined output in 1951 of the 3 existing medical schools was 25 graduates from Djakarta, 3 from Surabaya, and 2 from Djogjakarta, or 30 in all. There is a low government stipend for some students who must then enter government service for a stipulated period. Since many graduates are destined for private practice, and since the government service has little to offer in remuneration, it is difficult to obtain medical personnel for government service. A physician beginning in government service has a starting salary of 280 rupiah (\$25) a month, about the equivalent of the wages of a railway porter. Even a poor physician can make 10 times that much in private practice. Combining private practice with government service is therefore inevitable for the majority of physicians. This is facilitated by the fact that official government working hours are from 7 a. m. to 2 p. m.

The famous Eijkman Institute and the associated Institutes of Nutrition and Malaria are directly under the Ministry of Health. It was at the Eijkman Institute that vitamin B₁ was first isolated in its chemically pure form by Jansen and Donath in 1926. The Institute of Malaria has two branches with good laboratories in Surabaya and Makassar and a third branch under way in Djogjakarta.

Situated in most of the larger cities are central diagnostic laboratories which operate as branches of the Central Laboratory of Djakarta. Vaccines, including the "living" plague vaccine and the famous dried smallpox vaccine of Otten, are produced at the Pasteur Institute in Bandung. All the medical educational institutions are under the Ministry of Education.

Public Health Organization

The Netherlands East Indies Public Health Service supplanted the former Civil Medical Service in 1925 and was a full-time central public health service with headquarters at Batavia (now Djakarta). Its program was a centralized one until 1934 when provincial health services were organized in Java, Sumatra, and the East Archipelago, under central supervision. By 1937, local health departments had charge of soil sanitation, water supply, sewerage, hospital care, and dispensaries. Decentralization was completed by 1938, and general public health work was also transferred to local authorities and municipalities, an organizational structure which now continues under the central authority of the Ministry of Health.

A large proportion of medical personnel are now employed by the Ministry of Health and the provincial health organizations. In 1937, 651 of 1,135 practicing physicians were employed by the government, and in 1938, 527 of 1,247 physicians.

At the end of 1951, 614 of the slightly more than 1,000 physicians practicing in Indonesia were in government service. The roster of medical and associated medical personnel included:

Physicians.....	614
Pharmacists	6
Assistant pharmacists.....	600
Dentists.....	34
Sanitary engineers.....	3
Chemists	3
Sanitary inspectors.....	10
Analysts.....	30
Nurses	3,500
Midwives.....	1,466
Malaria mantris.....	296
Laboratory technicians.....	226
Plague mantris and technicians.....	407
Vaccinator mantris.....	600
Health education mantris.....	300
Home visitors.....	12

The budget of the Ministry of Health, which covers most of the medical service and all of the public health service, was 5.2 percent of the national budget for 1951 or 6 rupiah per capita per annum, the equivalent of approximately 50 cents.

In general, it can be seen that the public

health problems are widespread and profound, complicated by great distances, poor communications, illiteracy, and poverty. The population, thinly spread in most areas but highly concentrated in Java, is increasing so rapidly that efforts to improve the standard of living scarcely can keep abreast of the increment. Sometimes the situation appears hopeless, but the potential wealth and delightful terrain of Indonesia plus the willingness and natural desire for a democratic way of life and general

temperament of the Indonesians themselves combine to present an inspiring challenge to make these thousands of islands one of the bright spots in this world. The exasperating contrast between what is and what could be—the obvious unreasonableness of it—places a tremendous burden of proof upon all the precepts of planning for human welfare.

NOTE. The photographs and map are supplied through the courtesy of the information division of the Embassy of Indonesia.

Heart Disease Screening in X-ray Surveys

Although chest X-ray surveys search primarily for undiscovered tuberculosis, any suspicious shadow on the photofluorogram deserves special attention, and film readers will uncover many unsuspected neoplasms and cardiovascular abnormalities. Through the years, it has been found that a significant number of persons with nontuberculous chest disease can be discovered in this way—an “extra dividend” of the tuberculosis survey.

The Lung Cancer Committee of the American Cancer Society, at its September 1952 conference in New Hampshire, recommended that the Society cooperate with other voluntary and official agencies in the conduct of X-ray screening programs.

The American Heart Association, the National Tuberculosis Association, and the Public Health Service urge also that every chest X-ray campaign be used to its full potential for heart disease case finding. To this end, the three organizations recently issued the following public statement:

“1. Local voluntary and official health and medical agencies should be urged to accept the responsibility for setting up procedures for referral for diagnostic follow-up and supervision of those cases of suspected heart disease that are found incidentally in the course of reading mass chest X-ray survey films for tuberculosis by

those qualified to read films for tuberculosis but without particular qualifications for reading for abnormal heart shadows.

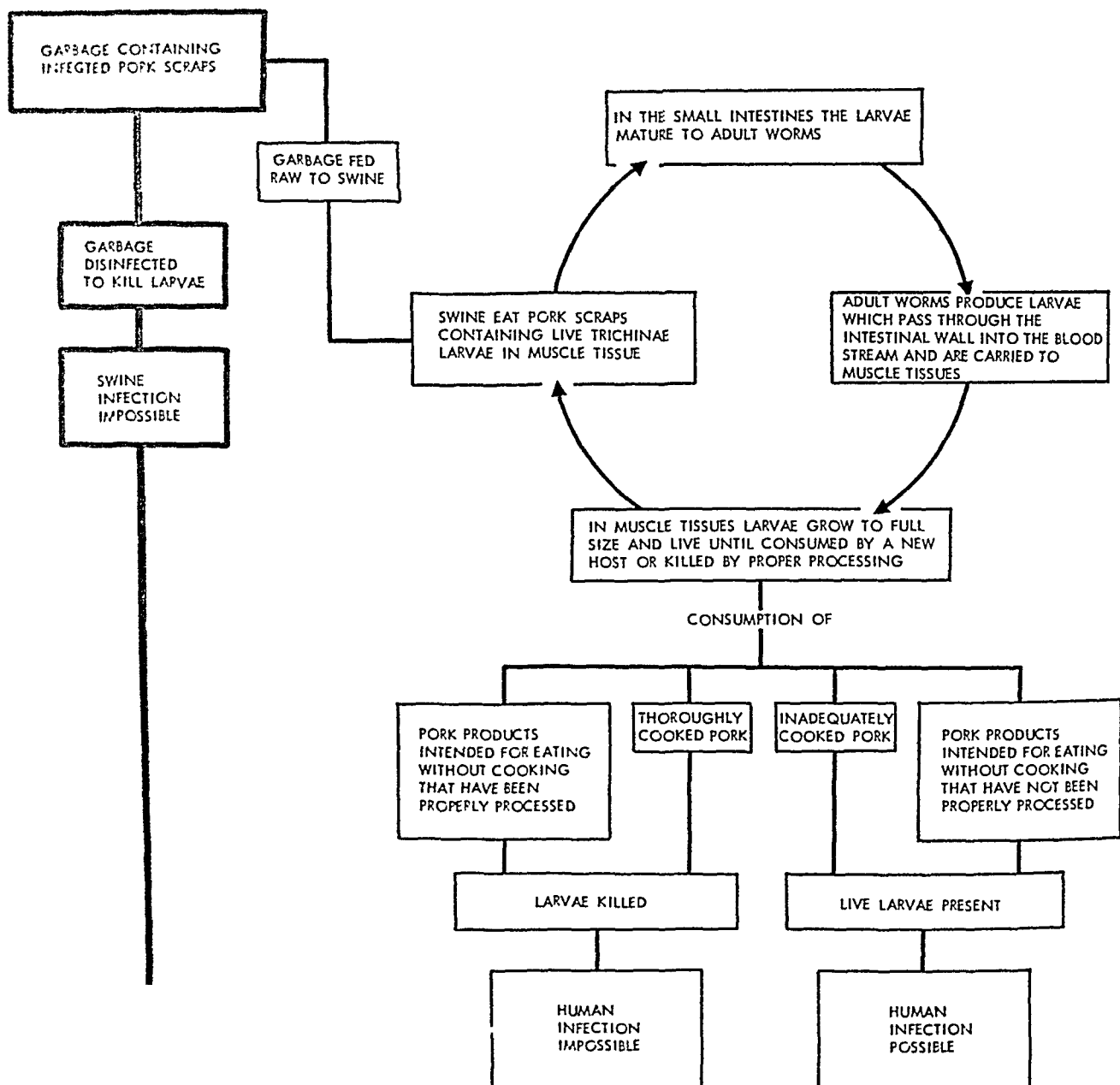
“2. Facts accumulated to date do not justify, at present, a general recommendation to local voluntary and official agencies that any additional procedures (readings by cardiologists, recording of such items as height and weight, and self-completed history form) over and above those outlined in the preceding paragraph be added to mass chest X-ray screening programs in order to raise the level of case finding for heart disease, except on a special study basis.”

The practices of many communities have long been in accord with these principles, and the joint statement represents a crystallization of the experience of these communities.

No single satisfactory screening test, or combination of tests, has as yet been developed which could be justified solely as a way to detect heart disease before obvious signs and symptoms appear. That is why the epidemiological study now in progress at Framingham, Mass., under the auspices of the National Heart Institute includes “an appraisal of the value and efficiency of various methods and procedures for diagnosing heart disease.” As the Institute further points out: “This may lead to a simple way of quickly screening people to detect those who have heart disease.” In the meantime, however, community-wide chest X-ray surveys remain an opportunity for cardiovascular case finding that should not be overlooked.

From the Division of Chronic Disease and Tuberculosis, Public Health Service.

Trichinosis



Human Trichinosis: Transmission and Control

Prevalence • Transmission • Prevention

Highlights from the First National Conference on Trichinosis, 1952

The problem of trichinosis in the United States was reexamined at the First National Conference on Trichinosis, held at the American Medical Association's headquarters in Chicago on December 15, 1952. Sponsoring the conference were the American Board of Veterinary Public Health, the American Medical Association, the American Society of Clinical Pathologists, the American Veterinary Medical Association, the Association of State and Territorial Health Officers, the Conference of Public Health Veterinarians, the Michigan-Memorial Phoenix Project of the University of Michigan, and the Public Health Service.

Topics considered by the conference included the prevalence of trichinosis in man and in swine, principal clinical features of the disease in man, relation of garbage to swine diseases, regulation of garbage-feeding practices, the Federal meat inspection program, the effects of rapid-freezing temperatures and of ionizing radiation on trichinae in pork, and State problems in the control of garbage-borne swine diseases.

The précis appearing here of eight of the conference discussions were prepared by the discussants. The essential points of a ninth, by Ralph J. Van Derwerker of the Public Health Service, are included in the paper presented on page 421. Duplicated copies of the complete papers and of the recommendations adopted by the conference may be obtained from the Secretary of the First National Trichinosis Conference, c/o Veterinary Public Health Section, Epidemiology Branch, Communicable Disease Center, Public Health Service, Atlanta 5, Ga.

A Health and Economic Problem

Trichinosis is a disease of animals, particularly of swine, which affects man when raw or improperly cooked pork containing viable trichinae is eaten. Trichinosis has been shown to have an almost worldwide distribution. It is most prevalent in countries where pork is often consumed raw and least prevalent in Jewish and Mohammedan areas.

Hall and his associates have published a series

of papers concerning examination for trichinae of human diaphragms obtained at autopsy. Of 5,313 diaphragms, 855 showed evidence of trichinae. It is estimated that 1 out of 6 persons in the United States, or about 25,000,000, alive today probably harbor trichinae. To reach this total, there would have to be 350,000 new infections each year. If the conservative figure of 51 larvae or more per gram of diaphragm muscle is used as an arbitrary threshold for producing symptoms, 4.5 percent of

all persons infected, or about 16,000, should exhibit clinical symptoms. This estimate far exceeds the annual average of 336 cases (1942 through 1951) reported in this country. The difference is probably due to inadequate reporting, mildness of symptoms, and the difficulties of making a clinical diagnosis.

It is estimated that of the 60,000,000 hogs slaughtered yearly, 1.5 percent, or 950,000, are infected with trichinae. Although only 40 percent of the trichinosis in hogs can be blamed on those hogs fed entirely on raw garbage, a majority of the remaining 60 percent must be attributed to those fed partly on raw garbage.

Trichinosis is a national problem not only of public health concern, but of economic importance to producers of pork.

—VERNON B. LINK, M.D., *deputy officer in charge of the Communicable Disease Center, Public Health Service*

Garbage-Borne Swine Diseases

Garbage serves as an excellent vehicle for transmission of viral, bacterial, and parasitic diseases in swine. Hog cholera, vesicular exanthema, foot-and-mouth disease, salmonellosis, tuberculosis, brucellosis, and trichinosis are all transmitted in garbage. Hog cholera is the most important porcine disease in the United States, but fortunately this disease is not transmitted to other animals or to man. Vesicular exanthema produces heavy losses among hogs, the only animals that are naturally susceptible to this disease. Foot-and-mouth disease affects not only hogs, but also other cloven-footed animals. Trichinosis affects swine and at least 25 other species of animals. Its chief economic importance lies in the danger of its transmission to man.

All four of these important diseases of swine are associated with the feeding of raw garbage. Their control, therefore, depends upon elimination of this practice. Uniform State and Federal regulations are needed for control of garbage feeding.

Canada and Great Britain have had success in controlling these diseases by requiring that garbage which is fed to swine must be cooked.

Atlanta, Ga., has found incineration to be the most efficient and economical method of disposing of garbage.

—JAMES H. STEELE, D.V.M., M.P.H., *chief of the veterinary public health section, epidemiology branch, Communicable Disease Center, Public Health Service.*

Trichinae in Swine

Of the many mammalian hosts of *Trichinella spiralis*, only the domestic hog is of importance from the standpoint of human health. There is reason to believe, however, that domestic swine in the United States were once infected with trichinae to a much greater extent and to a significantly greater degree than at present.

In the 1930's nearly 1 percent of farm-raised hogs and about 10 percent of garbage-fed hogs in the Atlantic seaboard States harbored trichinae. At least two-thirds of the infected farm-raised hogs contained the parasites in numbers so small that they would undoubtedly have escaped detection by routine microscopic inspection, whereas only about one-third of the infected garbage-fed hogs contained parasites in such small numbers.

In a recent study of more than 3,000 hogs originating in several corn-belt States, trichinae were found in only 0.6 percent when the examinations were made by digesting the pillars of the diaphragm in acidified pepsin. Trichinae were not found in any of these infected diaphragms when they were examined routinely in press preparations, showing that the infections were very light. In parallel studies of a series of about 1,500 samples from garbage-fed hogs on the eastern seaboard, trichinae were found in 11.5 percent when the samples were examined by the digestion method and in nearly 5 percent when examined routinely in press preparations. These data re-emphasize the role of garbage feed in the transmission of trichinae to hogs and to human beings who eat the infected meat raw, inadequately cooked, or imperfectly cured.

—BENJAMIN SCHWARTZ, M.D., *chief of the zoology division, Bureau of Animal Industry, U. S. Department of Agriculture*

Prevalence and Prevention

In autopsy surveys of over 10,000 persons in the United States, the average incidence of recovery of trichinae larvae was 16 percent. However, it has been demonstrated that with more thorough methods of examination the incidence of recovery is about 30 percent. Available data indicate that the incidence of trichinosis in both man and swine in the United States is the highest of any country in the world. The vast majority of human infections are mild and subclinical; most infections that are severe enough to reach the clinical level are not diagnosed; and among those that are clinically diagnosed, the mortality rate is about 5 percent.

Besides thorough cooking, the methods of prevention include curing and low-temperature treatment of pork as prescribed by Federal regulations. Other control measures adopted by some countries include microscopic inspection of muscle from every hog that is slaughtered, prevention of feeding of garbage to hogs, or cooking of raw garbage if it is to be fed to hogs. Promising new methods of rendering pork free from the danger of trichinosis include extension of techniques for low-temperature treatment and exposure of all raw pork to ionizing radiation. These new methods should be subjected to further intensive research. High hope is held that in the near future all raw pork may be so processed as to reduce the danger of trichinosis to man to a point of practical insignificance in this country.

—S. E. GOULD, M.D., *pathologist, Wayne County General Hospital, and clinical professor of pathology, Wayne University College of Medicine*

Federal Meat Inspection

The method of control of trichinosis currently employed by the Federal meat inspection service of the U. S. Department of Agriculture contemplates special treatment under inspection supervision of all pork products customarily eaten without cooking. The so-called microscopic examination was used between 1890 and 1906, but only on export pork. Since 1906 no

microscopic examinations have been made of any pork coming under the Federal meat-inspection program.

Under the Federal program, almost all processed pork products are classed as pork products customarily eaten without cooking. The exceptions include bacon, fresh pork sausage and similar breakfast sausage, and hams and pork shoulder cuts that have been cured but not smoked or otherwise processed. Fresh pork cuts, such as chops and roasts, are not classed as pork products customarily eaten without cooking.

Thoroughly tested heating, refrigerating, or curing processes are prescribed and used in federally inspected meat-packing plants for treating the specified pork products. An extensive survey made recently found that the products so treated were safe without exception. Only dead trichinae were found, and these only in a comparatively small number of cases.

—A. R. MILLER, D.V.M., *chief of the Federal meat inspection service, Bureau of Animal Industry, U. S. Department of Agriculture*

Low-Temperature Treatment

Although data on the effects of rapid-freezing temperatures on trichinae are thus far limited, recent studies indicate that pork may be made safe against trichinosis by (1) rapidly lowering its temperature to -35°C . or (2) by an initial rapid lowering of its temperature to -18°C . and subsequent storage for 3 days at this temperature. Thus, only a few hours may be required to make pork safe by a rapid-freezing method instead of up to 20 days as prescribed under present Federal regulations.

The practicability and the desirability of adopting a rapid-freezing method to make all pork, both that intended for interstate shipment and that for local sale, free from infective trichinae are considered.

—DONALD L. AUGUSTINE, Ph.D., *professor of tropical public health, Harvard University*

Effect of Ionizing Radiation

Ionizing radiations, such as X-rays, gamma rays, and high energy electrons, have been

shown to be effective in killing or interfering with normal development of living material. During the past year the effect of radiation on the life cycle of the causative agent of trichinosis (*Trichinella spiralis*) has been studied.

It has been found that about 1,000,000 roentgens of 200 kv. X-rays are necessary to kill all trichina larvae irradiated in vitro. The killing dose of cobalt-60 gamma rays (1.17 and 1.31 Mev.) was found to be about the same.

However, the life cycle of trichina requires that the ingested larvae grow to maturity in the host and then reproduce. It has been found that radiation doses much smaller than killing doses are sufficient to inhibit maturation and that still smaller doses will sterilize the female trichinae and prevent reproduction. With cobalt-60 gamma rays, about 10,000 roentgens will sterilize all the female larvae in rat muscle, as shown by microscopic examination of the adult female forms recovered from the intestinal tract at 6 days and larval forms recovered from the muscle of the test animals at 30 days. Somewhat lower than killing levels of 200 kv. X-rays are equally effective.

Because of the great penetrating power of cobalt-60 radiation, it is believed that large sections of meat such as hog carcasses could, under suitable conditions, be irradiated as a whole, thus providing a direct method of breaking the trichina cycle.

—HENRY J. GOMBERG, Ph.D., *assistant director, Michigan-Memorial Phoenix Project, and research associate, Atomic Energy Commission Laboratory, University of Michigan;* and S. E. GOULD, M.D., *pathologist, Wayne County General Hospital, and research associate, Atomic Energy Commission Laboratory*

State Problems in Control

The continued practice of feeding raw garbage to only a small portion of the swine marketed in the United States is jeopardizing the entire livestock industry of the country. This practice spreads trichinosis, cholera, vesicular exanthema, and even foot-and-mouth disease.

Practices of hog raising vary in different sections of the United States, and the problems of garbage-borne diseases vary with different States and sections of the country. The two main points to consider in controls affecting garbage-borne diseases of hogs are these: (1) Is the State an exporter or importer of hogs and pork? (2) Is the State an exporter or importer of garbage?

Present interstate and State regulations designed to prevent garbage-borne diseases of hogs are ineffectual. Regulations addressed solely to the movement of raw garbage interstate are not sufficient to handle the problems of the States in controlling garbage-borne diseases of swine. Controls must consider garbage, hogs, and pork. The following regulations are recommended: (1) Prevent the interstate movement of raw garbage except under certain specified conditions; (2) prohibit movement of live hogs and pork out of any State which shall fail to have and enforce regulations requiring the cooking of garbage that is fed to hogs.

The success of any individual State's efforts to control these animal diseases rests squarely on the effectiveness of interstate controls.

—OSCAR SUSSMAN, D.V.M., *chief of the bureau of veterinary public health, division of environmental sanitation, New Jersey State Department of Health*



Trichinosis Control and Vesicular Exanthema

By JACK C. HALDEMAN, M.D., M.P.H., JAMES H. STEELE, D.V.M., M.P.H.,
and RALPH J. VAN DERWERKER, B.S.

TRICHINOSIS, a parasitic disease of animals and man, is a public health problem in the United States. Apparently, it is more serious here than in any other country in the world.

The evidence upon which these statements are based has been in the literature for over a decade and a half (1-3). Although there is still no known specific treatment for this disease in either man or animals, there are practicable preventive measures. Yet in the United States relatively little has been accomplished in the application of these measures and in the breaking of the trichinosis cycle, with the exception of Federal meat inspection procedures to control the processing of pork to be eaten without cooking.

In the late 1930's and early 1940's, studies by Gould (4), Hall (3), Sawitz (5), and Wright (6) indicated that 1 out of every 6 persons in the United States was infected to some extent with the parasite *Trichinella spiralis*.

Dr. Haldeman, from 1948 to 1951 medical director of the Arctic Health Research Center of the Public Health Service, is assistant chief of the Bureau of State Services. Dr. Steele, chief of the veterinary public health section of the epidemiology branch, Communicable Disease Center, Public Health Service, and veterinary consultant for the Bureau of State Services, was the secretary of the First National Conference on Trichinosis, held in Chicago on December 12, 1952. Mr. Van Derwerker, chief of the municipal and rural branch of the Division of Sanitation, is Public Health Service representative on the Continuing Committee of the National Conference on Trichinosis.

Wright and his associates, on the basis of the studies at the National Institutes of Health, estimated that 4.5 percent of the number infected had sufficiently heavy infections to have developed clinical symptoms (6). If these figures could be assumed to be applicable to the present population, it would mean that millions of Americans alive today have been infected to some extent with the parasite, and it seems probable that many of these persons have had clinical symptoms. Further, on the basis of the aforementioned studies the number of cases expected annually would be several thousands.

Although trichinosis is a reportable disease in 44 States, the disease is seldom diagnosed clinically, and infections other than those in epidemic form are usually unrecognized. The fact that for the 10-year period, 1942 through 1951, an average of only 336 cases was reported annually to the Public Health Service illustrates this point. According to unpublished records, at least 1 epidemic occurred during this period which involved over 300 cases of trichinosis, and in this instance the disease was not diagnosed until some 24 days after the first symptoms were reported.

The practice of feeding raw or untreated garbage is known to be of primary importance in the spread of trichinae among swine. Schwartz (7) reports an incidence of trichinae in raw-garbage-fed hogs about five times as great as that in so-called grain-fed hogs. The consumption of raw, untreated, or inadequately cooked pork from garbage-fed hogs, furthermore, is considered primarily responsible for the high incidence of *Trichinella spiralis* in man (8,9). In both England and Canada, the sterilization of all garbage fed to swine has been

required by law for many years, and in both of the countries the incidence of trichinosis is relatively low.

Vesicular Exanthema Epidemic

The recent nationwide epidemic of vesicular exanthema, a virus disease in swine, has focused new attention in this country on the dangers of feeding raw garbage to swine. As a result of this epidemic, there are indications of strong support among the swine industry and the agricultural agencies for the elimination of feeding raw garbage.

On June 16, 1952, vesicular exanthema was detected among swine at a hog-cholera serum plant in Nebraska, and within 8 months infected swine had been found in 36 States scattered throughout the Nation. Epizootiological investigations by the U. S. Department of Agriculture and the various State agencies concerned indicated the possibility that garbage containing infected pork scraps had been fed raw to swine at a farm in Wyoming, and that contaminated swine from this State and from Nebraska had been shipped to other areas of the country before the disease was recognized. Most of the outbreaks in the other States were also identified with establishments where garbage was fed raw to swine, and the probable vehicle of infection was found to be contaminated pork scraps in the garbage.

Vesicular exanthema, though not transmissible to man and therefore not of direct public health significance, has serious economic and agricultural implications. The U. S. Department of Agriculture reported on February 7, 1953, that since the beginning of the epidemic 100,801 animals in 32 of the States involved had been disposed of by burial or special processing, and that 44,821 animals are awaiting disposal. It is evident, therefore, that the losses to swine raisers and allied industries and the costs to State and Federal governments for indemnities will be many millions of dollars. And to these must be added the costs of disinfecting plants, stockyards, and railway stock cars, of supervising disinfection, and other similar expenses, as well as losses resulting from restraint of livestock movement as a result of quarantines.

An additional concern to agricultural authorities is the fact that the symptoms of vesicular exanthema in swine are almost identical to those of foot-and-mouth disease. The control of foot-and-mouth disease depends so much on prompt diagnosis, slaughter of the infected herd with burial on the premises, and thorough disinfection of the entire area and plant that any delay in diagnosis of vesicular disease could well be disastrous to the livestock industry of the Nation.

Public Health Considerations

Thus, since disinfection of garbage fed to swine is of major importance in the eradication of both trichinosis and vesicular exanthema, combining the public health concern over trichinosis with the agricultural and economic concern over vesicular exanthema is a logical and necessary step. In addition to the public health worker's concern with trichinosis control, he is concerned with sanitary disposal of community solid wastes. For example, in some areas where the practice of feeding garbage to swine was discontinued during the epidemic, the garbage was disposed of by dumping it into a convenient river, thus creating a water pollution problem. Also, of course, he is concerned with such problems of hog farm sanitation as insect and rodent control and nuisance abatement.

Probably the best disease control measure, as well as sanitation measure, would be the discontinuance of raising swine on garbage and the disposal of garbage in incinerators or sanitary landfills or the utilization of it as dried feed or fertilizer compost. However, it is estimated that about 1,500,000 hogs are raised annually in the United States either wholly or partly on commercial garbage. Although they represent less than 2 percent of the hog population in this country, the shift away from garbage feeding would have an obvious economic impact. Until such a step is taken, therefore, the next best solution appears to be disinfection of garbage before it is fed to swine.

The Public Health Service's part in the regulation of garbage-feeding practices concerns primarily the interstate shipment of garbage. In 1941, an Interstate Quarantine Regulation

(section 72.23, 1947 revision) was issued, requiring that any garbage shipped or transported across State lines must be heated to 212° F. for 30 minutes before being fed to swine. Prior to the 1952 outbreak of vesicular exanthema, seven of the States and the Territory of Hawaii had similar regulations. Since the outbreak 9 States and Alaska have adopted regulations and/or legislation requiring heat-treatment of garbage used for swine feed, and at least 28 other States have either introduced similar measures in their legislatures or are preparing to do so.

USDA-PHS Control Measures

Recognizing the importance of the public health worker's role in the sanitary disposal of garbage, the U. S. Department of Agriculture last year requested the assistance of the Public Health Service in its vesicular exanthema eradication program. The Department urged the Federal Security Administrator to take emergency measures to insure enforcement of the Interstate Quarantine Regulation concerning garbage and expressed the hope that the Public Health Service would take appropriate steps to stimulate and assist State programs requiring disinfection of garbage fed to swine.

In accordance with the pursuant understanding, the U. S. Department of Agriculture has been concerned primarily with measures designed to arrest the current outbreak of vesicular exanthema. These include supervision of disinfection of contaminated yards, pens, and railway stock cars; quarantine of affected areas; and a program for disposal of and indemnity for condemned swine, and the cleaning and disinfection of infected premises.

Both the Department and the Service have, of course, been interested in the development of State programs for controlling the feeding of raw garbage to swine. In view of the lack of published information on methodology of disinfecting garbage, they worked together in compiling and publishing a summary of all available material on the subject (10). This activity pointed out the need for further research concerning heat-treatment systems,

equipment, economics, and related time-thermal characteristics required for disinfection. Iowa State College has recently applied for a Public Health Service grant to study time-temperature requirements for effective disinfection of garbage in relation to various methods of heat treatment.

The Public Health Service has also been co-operating in the vesicular exanthema eradication program through more effective control over the interstate shipment of raw garbage. In August 1952, the Federal Security Agency regional offices were requested to determine the extent of current violations of the Interstate Quarantine Regulation concerning garbage. These regional surveys have resulted in considerable program progress in certain major metropolitan areas and in a number of border areas where interstate shipment of raw garbage has been practiced.

Intrastate Regulation

Intrastate as well as interstate regulation of garbage-feeding practices is essential if the spread of garbage-borne diseases is to be controlled. In many States, disinfection of garbage is still not required, and many of the existing programs need strengthening.

A logical first step in developing intrastate control programs is a survey of garbage collection and disposal practices in each State. A basic data form (PHS Form 1764) has been developed by the Public Health Service for use in such surveys and has been made available to the States. Use of this form will permit collection of comparable data and, with the cooperation of State and local health departments, it should be possible to develop a nationwide inventory of practices. Such data should facilitate practicable planning of control efforts locally as well as in the States and for the Nation as a whole.

A second important step is the enactment of State legislation requiring the disinfection of all garbage used for swine feed and proper sanitation of hog farms. A suggested guide for such legislation, based on present regulations and experience in various States, has been prepared by the U. S. Department of Agricul-

ture and the Public Health Service. This guide is available through the Federal Security Agency regional offices. It provides technical data which will aid the States in developing legislation that is not only legally sound but also practical. For example, it is usually more practical to require treatment of garbage at the feeding farm than at its source; also, the requirement of a license or a permit has been found to be the most practical method of administering a program.

Although disinfection of garbage is the prime factor in the control of trichinosis and vesicular exanthema, the complete sanitation of the establishment involved should be given serious and continued consideration in any State control program. Sanitary solid waste disposal includes not only the disinfection of the potential vector of disease, but also the handling of the media so as to minimize insect and rodent breeding and to prevent water pollution. Nuisance abatement is also a factor and should be taken into account.

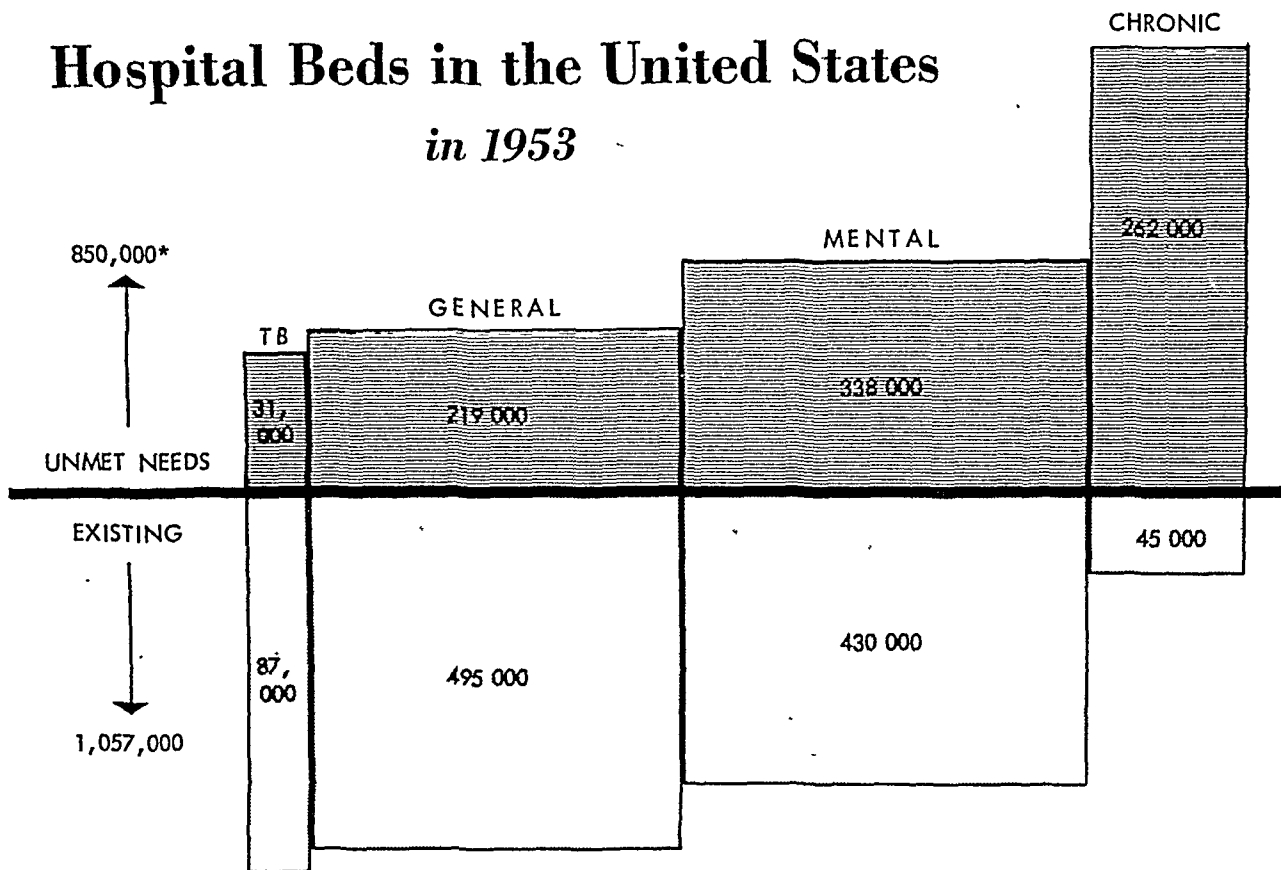
For many years, community solid waste problems have been more or less neglected by health workers, but the fact that these problems have serious health implications is now receiving increasing recognition. The recent vesicular exanthema outbreak has underscored the epidemic possibilities of one improper method of garbage disposal and has provided support for trichinosis control efforts. The time is appropriate for a vigorous nationwide program for proper treatment or disposal of garbage to control disease and to improve sanitation.

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Hospital Beds in the United States in 1953



*Exclusive of 117,000 Federal hospital beds. All data in this chart as of January 1, 1953.

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HOSPITAL BEDS are symbols of hospital services and are not an end in themselves. They do provide a useful measure of the physical facilities at hand for furnishing hospital services. The capacity to provide adequate health care in a community or a nation can be gauged substantially by the number of beds available, in relation to the number of people living in the area.

Prior to 1946 the building of new hospitals and hospital additions in the United States was

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sporadic, proceeding slowly in some communities and rapidly in others, according to local pressures and means and without regard to any general pattern or orderly plan. At the same time many communities and sections of the Nation had little or no available hospital care within ready reach. The end of World War II made possible a renewed interest in providing for many domestic needs. Physical facilities for the Nation's health became one aspect of this interest.

A broad program was launched in 1946 by Federal legislation to assist the States to inventory their existing hospitals, to define the total need for hospitals, and to map out a construction program to provide needed hospital and health center services. Financial assist-

ance was included, both for planning and construction. This legislation, the Hospital Survey and Construction Act (Public Law 725, 79th Cong.) has been popularly known as the Hill-Burton Act. Its administration was placed under the Surgeon General of the Public Health Service, as a part of the basic Public Health Service Act.

It required more than a year to develop initial inventories and comprehensive plans. Hospital inventories existed, compiled by the American Hospital Association and the American Medical Association, but the idea of inventory-plus-statewide-program was entirely new. The first complete set of these comprehensive plans reflected the facts as of about January 1, 1948. Today, after 5 years of experience on the part of the State hospital agencies, the record has been refined and general planning is based upon more intimate knowledge of local situations.

This report appraises the situation nationally and locally, as reflected by the current State hospital plans under the Hospital Survey and Construction Act. It also comments on the influence of the Hill-Burton program during 5 years of operation and refers to current problems relating to standards of need and standards for the degree of Federal aid now appropriate.

Where We Are Now

In the Nation as a whole we now have 1,218,000 existing hospital beds, according to State plan inventories as of January 1, 1953. These plans excluded Federal beds. This total is 202,000 more than was recorded in the first Hill-Burton inventory as of January 1, 1948. Of these, however, 161,000 beds are classified by the State agencies as nonacceptable on the basis of fire and health hazards, so that our net acceptable plant for all purposes is 1,057,000 beds. Almost one-half of this total, or 495,000 beds, is in general hospitals; mental hospitals have 431,000 beds; tuberculosis hospitals, 86,000 beds; and hospitals for chronic care, 44,000 beds.

The Hospital Survey and Construction Act establishes standards of need, for planning purposes, in each category of hospital. These standards are limits for construction with Fed-

eral assistance and do not preclude State planning to higher levels if warranted. For most States, however, the standards established in the Hill-Burton Act are much beyond the level of existing facilities. By these standards about 850,000 additional beds are needed nationally to provide adequate hospital care for all the people. Of these, 336,000 are needed in mental hospitals, 262,000 in chronic hospitals, 219,000 in general hospitals, and 31,000 in tuberculosis hospitals. Percentagewise, the Nation has 77 percent of its need met in tuberculosis facilities, 69 percent in general hospitals, 56 percent in mental hospitals, and 14 percent in chronic hospitals.

The historical record, by years from 1948 to 1953, for each category appears in table 1. By definition under the present regulations, this inventory excludes beds for civilians in Federal hospitals. These are chiefly in facilities of the Veterans Administration, plus a comparatively small number of beds in the hospitals operated by the Indian Service and the Public Health Service.

During the 5 years for which comprehensive State planning has been carried on, considerable net progress has been made in general hospitals: 107,000 additional acceptable beds are recorded, a gain of 28 percent. Tuberculosis beds have also increased more than 20 percent. Mental and chronic beds, on the other hand, while increasing slowly, are not keeping up with growth in population and obsolescence. In both these categories the remaining need is greater than in 1948. This constitutes one of the major challenges facing the Nation today in meeting the need for adequate hospital services.

National trends and national totals do not accurately reflect the real picture in regard to specific regions of the country. Among the States, wide differences exist as to relative status in providing an adequate hospital plant. Similar differences exist among the major socioeconomic regions of the Nation. Generally speaking, the States with large means have the least unmet need, while the least wealthy States have the greatest need. Thus, New York and Connecticut have only about 3.2 beds per 1,000 population still required, for all purposes. Mississippi and Alabama each need 8.3 more

beds per 1,000 population, while the national average of unmet need is 5.5 beds per 1,000 population. Regionally, the greatest unmet need for general hospitals is still in the southeastern States, although substantial progress has been made here during the past 5 years.

Similar contrasts appear for mental hospitals. The unmet need, nationally, is still 2.2

beds per 1,000 population. In New England it is only 1 bed per 1,000, but throughout the southeastern and southwestern States this need is nearly 3 beds per 1,000. Comparative positions are shown in the maps and in table 2.

The Hospital Survey and Construction Act requires that a coordinated system of general hospitals be planned within each State, under

Table 1. Civilian hospital beds in the United States and Territories, 1948-53

Hospital category and year (as of Jan. 1)	Estimated total beds needed ¹	Existing beds				Estimated additional beds needed
		Total	Nonaccept- able ²	Acceptable		
				Number	Percent of total need	
<i>All categories</i>						
1953-----	1, 899, 279	1, 218, 781	161, 354	1, 057, 427	55. 7	848, 567
1952-----	1, 899, 806	1, 193, 836	176, 013	1, 017, 823	53. 6	881, 983
1951-----	1, 883, 487	1, 185, 480	175, 562	1, 009, 918	53. 6	873, 569
1950-----	1, 850, 052	1, 118, 535	166, 339	952, 196	51. 5	897, 856
1949-----	1, 776, 673	1, 025, 179	145, 307	879, 872	49. 5	896, 801
1948-----	1, 776, 401	1, 016, 712	148, 752	867, 960	48. 9	908, 441
<i>General hospitals</i>						
1953-----	714, 469	572, 493	77, 308	495, 185	69. 3	219, 222
1952-----	708, 574	554, 084	79, 750	474, 334	66. 9	234, 240
1951-----	700, 952	548, 798	79, 606	469, 192	66. 9	231, 760
1950-----	682, 601	513, 814	76, 028	437, 786	64. 1	244, 815
1949-----	652, 611	474, 532	77, 364	397, 168	60. 9	255, 443
1948-----	652, 974	469, 398	81, 254	388, 144	59. 4	264, 830
<i>Mental hospitals</i>						
1953-----	766, 463	490, 598	59, 591	431, 007	56. 2	336, 676
1952-----	755, 097	482, 733	69, 801	412, 932	54. 7	342, 165
1951-----	744, 323	483, 310	67, 780	415, 530	55. 8	328, 793
1950-----	725, 203	462, 859	63, 721	399, 138	55. 0	326, 065
1949-----	692, 150	428, 931	47, 304	381, 627	55. 1	310, 523
1948-----	690, 381	427, 201	46, 858	380, 343	55. 1	310, 038
<i>Tuberculosis hospitals</i>						
1953-----	112, 075	100, 204	13, 506	86, 698	77. 4	30, 934
1952-----	133, 899	99, 147	11, 597	87, 550	65. 4	46, 349
1951-----	140, 391	96, 955	11, 604	85, 351	60. 8	55, 040
1950-----	148, 936	94, 024	12, 513	81, 511	54. 7	67, 425
1949-----	155, 101	85, 466	12, 906	72, 560	46. 8	82, 541
1948-----	155, 987	84, 158	13, 007	71, 151	45. 6	84, 836
<i>Chronic hospitals</i>						
1953-----	306, 272	55, 486	10, 949	44, 537	14. 5	261, 735
1952-----	302, 236	57, 872	14, 865	43, 007	14. 2	259, 229
1951-----	297, 821	56, 417	16, 572	39, 845	13. 4	257, 976
1950-----	293, 312	47, 838	14, 077	33, 761	11. 5	259, 551
1949-----	276, 811	36, 250	7, 733	28, 517	10. 3	248, 294
1948-----	277, 059	35, 955	7, 633	28, 322	10. 2	248, 737

¹ As set by Title VI of Public Health Service Act.

² As classified by State agencies, on the basis of fire and health hazards.

Source: State Plans for Hospital Construction.

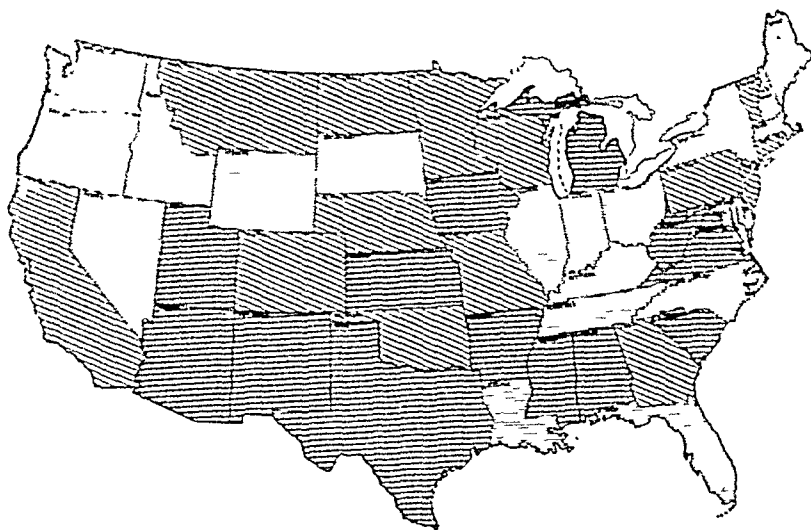
Remaining

Need

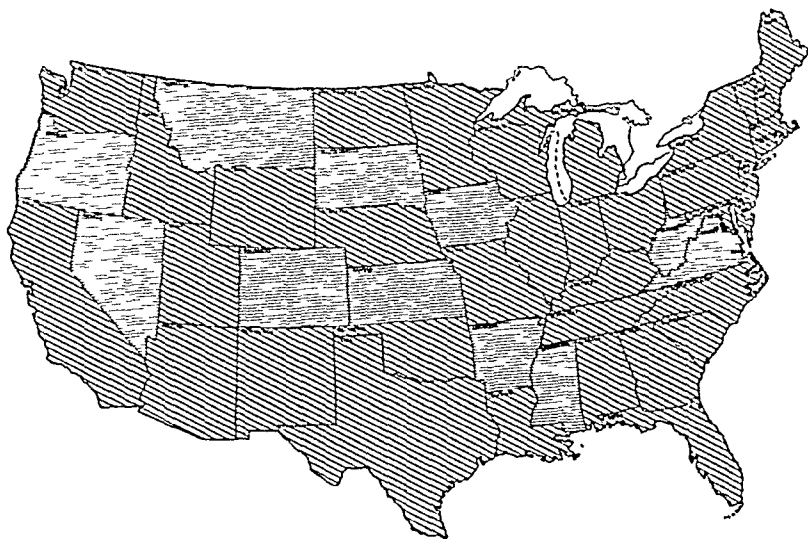
for

Hospital

Beds



Mental

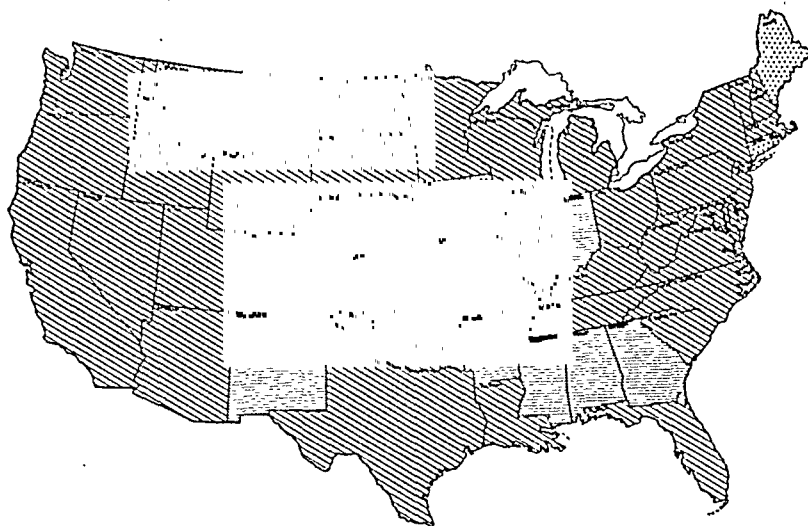


Chronic Disease

which regional hospital centers would provide leadership, specialized care, and consultation for smaller community hospitals within the region. Under the Hill-Burton program the United States is composed of 375 such regions, as defined in present State plans. Studies of these regions show that there are actually wide differences as to the level of facilities now available in single hospital regions. In Arkansas the proportion of acceptable facilities available varies from region to region, from about 25 percent of need met to nearly 75 percent. In Florida, it ranges from 42 percent to 87 percent; in Kansas, from 52 percent to 92 percent; and in Idaho, from 45 percent to 96 percent. Obviously, State totals may obscure important

differences among hospital regions in the present available plant.

For local communities there are also areas of acute need with little or no available hospital plant. A recent check shows 250 hospital areas still without any acceptable hospital facilities. These areas include about 3 percent of the Nation's population and require some 13,000 beds to meet standards for general hospital care. This study also shows that about 5 percent of the population of the Nation live in areas where less than 25 percent of the general hospital facilities needed are available. These facts give some indication of the work yet to be done.

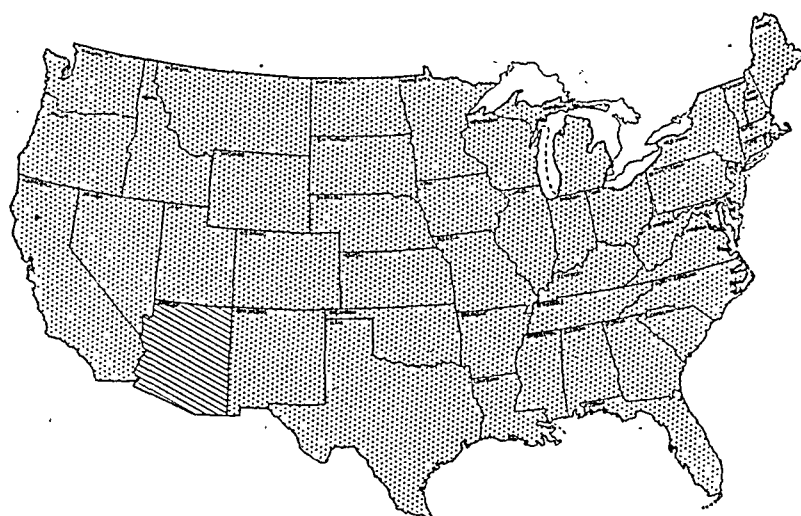


General

**Rate per
1,000
Population**



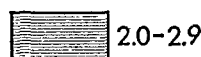
0-0.99



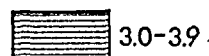
Tuberculosis



1.0-1.9



2.0-2.9



3.0-3.9

Effect of the Hill-Burton Program

The act requires a continuous inventory and positive planning of hospital expansion in each State. This has greatly stimulated orderly growth of the Nation's facilities for protecting the health of its people. Its direct encouragement of construction has been substantial, when measured by the dollar volume of hospital construction (1,2). During the last 3 years the value of work placed on Hill-Burton projects has averaged about one-third of all non-Federal hospital construction (see chart).

A number of additional benefits also have accrued (3). Perhaps the most significant, in regard to improving the quality of service,

have been the very rapid increase in State statutes establishing hospital licensing, improved architectural design, attracting of physicians to rural communities, and creating a greater awareness of the problems of adequate care for chronic illness.

The effect of the hospital survey and construction program is quite significant in regard to the distribution of projects assisted. This is governed by the statutory formula for allocation among the States of the annual appropriation and by the conditions required as to a graduated scale for matching local funds. In each State, the formula for matching is based on population, weighted by its financial ability. As a result, the greatest Federal assistance has

Table 2. Additional needs for hospital beds in the United States as of January 1, 1953, according to State hospital plans approved under the Hill-Burton Act

State and socioeconomic region	Civilian population per plan (thousands)	Additional beds needed—rate per 1,000 population				
		All hospitals	General	Mental	Chronic	Tuberculosis
United States and Territories.....	153, 260	5. 5	1. 4	2. 2	1. 7	0. 20
New England.....	9, 312	3. 8	1. 5	1. 0	1. 2	. 02
Connecticut.....	2, 026	3. 2	. 9	1. 1	1. 2	-----
Maine.....	912	5. 1	. 9	2. 3	1. 8	. 02
Massachusetts.....	4, 691	3. 7	1. 8	. 7	1. 2	-----
New Hampshire.....	531	4. 2	1. 5	. 6	1. 9	. 14
Rhode Island.....	774	3. 5	2. 0	1. 2	. 3	. 01
Vermont.....	378	4. 9	1. 6	1. 3	1. 9	. 15
Middle East.....	36, 117	4. 4	1. 3	1. 4	1. 6	. 20
Delaware.....	318	4. 7	. 4	2. 9	. 9	. 52
District of Columbia.....	769	3. 2	1. 1	-----	1. 8	. 31
Maryland.....	2, 306	4. 6	1. 1	2. 0	1. 2	. 32
New Jersey.....	4, 972	4. 9	1. 5	1. 6	1. 7	. 04
New York.....	15, 267	3. 3	1. 0	. 7	1. 4	. 14
Pennsylvania.....	10, 480	5. 4	1. 6	1. 7	1. 9	. 35
West Virginia.....	2, 005	7. 4	1. 7	3. 6	2. 0	. 06
Southeast.....	31, 471	6. 8	1. 8	2. 9	1. 8	. 26
Alabama.....	3, 053	8. 3	2. 0	3. 9	1. 9	. 53
Arkansas.....	1, 908	7. 6	2. 0	3. 6	2. 0	-----
Florida.....	2, 729	5. 8	1. 5	2. 7	1. 7	-----
Georgia.....	3, 418	5. 6	2. 2	1. 8	1. 6	. 07
Kentucky.....	2, 913	7. 1	1. 9	2. 8	1. 9	. 58
Louisiana.....	2, 670	6. 3	1. 3	2. 8	1. 9	. 22
Mississippi.....	2, 169	8. 3	2. 3	3. 5	2. 0	. 47
North Carolina.....	4, 014	6. 3	1. 6	2. 8	1. 9	-----
South Carolina.....	2, 096	7. 0	1. 7	3. 2	1. 9	. 19
Tennessee.....	3, 281	6. 2	1. 7	2. 6	1. 5	. 47
Virginia.....	3, 220	7. 1	1. 8	3. 0	2. 0	. 37
Southwest.....	11, 247	6. 3	1. 2	2. 9	1. 9	. 30
Arizona.....	777	7. 8	1. 2	3. 7	1. 8	1. 03
New Mexico.....	668	8. 1	2. 0	3. 6	1. 9	. 50
Oklahoma.....	2, 218	4. 9	1. 5	1. 5	1. 8	. 12
Texas.....	7, 584	6. 4	1. 1	3. 2	1. 9	. 25
Central.....	39, 893	5. 8	1. 4	2. 6	1. 8	. 09
Illinois.....	8, 672	5. 6	1. 2	2. 7	1. 6	. 11
Indiana.....	3, 932	7. 1	2. 3	2. 6	1. 9	. 29
Iowa.....	2, 621	6. 6	. 8	3. 7	2. 0	. 01
Michigan.....	6, 361	6. 7	1. 8	3. 1	1. 8	-----
Minnesota.....	2, 982	4. 7	1. 0	1. 8	1. 9	-----
Missouri.....	3, 952	4. 6	. 9	1. 8	1. 7	. 23
Ohio.....	7, 938	5. 9	1. 3	2. 6	1. 9	. 10
Wisconsin.....	3, 435	4. 7	1. 2	1. 8	1. 7	-----
Northwest.....	7, 939	5. 2	1. 0	2. 3	1. 8	. 06
Colorado.....	1, 307	4. 1	. 6	1. 6	2. 0	-----
Idaho.....	588	6. 5	1. 6	2. 9	1. 9	. 12
Kansas.....	1, 905	6. 2	. 9	3. 3	2. 0	. 01
Montana.....	589	4. 4	. 7	1. 7	2. 0	-----
Nebraska.....	1, 326	3. 7	. 9	1. 4	1. 4	. 10
North Dakota.....	605	4. 8	1. 5	1. 4	1. 8	-----
South Dakota.....	650	5. 9	1. 5	2. 1	2. 0	. 29
Utah.....	687	6. 7	1. 4	3. 3	1. 9	. 08
Wyoming.....	282	5. 4	1. 1	2. 5	1. 8	. 06
Far West.....	14, 449	4. 7	1. 5	1. 6	1. 6	. 08
California.....	10, 421	4. 4	1. 5	1. 3	1. 5	. 09
Nevada.....	166	6. 5	1. 5	2. 6	2. 0	. 43
Oregon.....	1, 519	5. 7	1. 5	2. 2	2. 0	. 08
Washington.....	2, 343	5. 6	1. 5	2. 4	1. 7	-----
Territories.....	2, 832	9. 9	2. 1	3. 7	1. 8	2. 29
Alaska.....	129	7. 6	3. 1	2. 1	1. 7	. 72
Hawaii.....	474	6. 1	1. 6	3. 1	1. 4	-----
Puerto Rico.....	2, 203	10. 9	2. 2	4. 0	1. 9	2. 88
Virgin Islands.....	26	6. 0	-----	4. 4	-----	1. 55

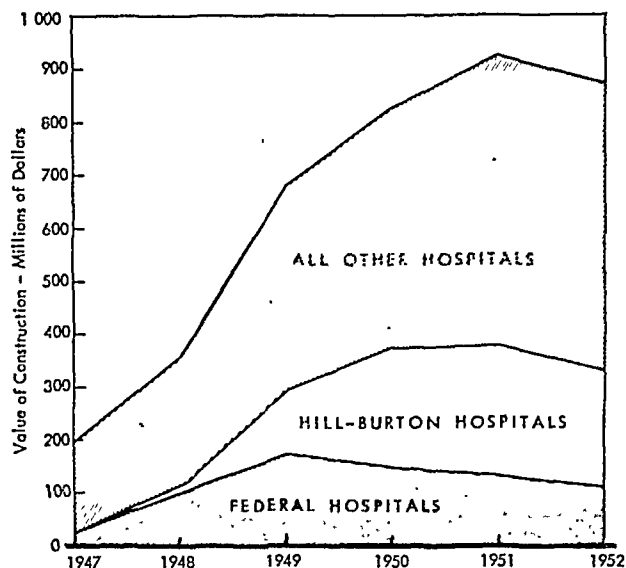
been given in the least wealthy States. The record shows that remaining need is still the greatest in these States.

Expressed broadly, the Hill-Burton program in 5 years has assisted in building about 1.0 bed per 1,000 population in the neediest States. These are States where the remaining additional need is still about 8 beds per 1,000 population. A proportionally lesser volume of assistance—about 0.3 beds per 1,000 population—has been accorded States with the least unmet need. In these States the remaining need is now under 3.5 beds per 1,000 population. Comparative study of the relation between remaining need and the degree to which these States are rural in character shows that the greatest need occurs in those States which have the highest proportion of population living in rural areas. In brief, Hill-Burton aid has been distributed to the greatest degree in those States which are least wealthy, most rural, and with greatest proportional unmet need.

Within the several States, distribution of assistance to specific projects has been governed by a priority system based on unmet need, as established in the State plan. In consequence the stimulus of Federal assistance has encouraged many communities where unmet need was the greatest to raise local funds for matching Federal grants, in accordance with the intent of the act. Recent studies have indicated that 38 percent of all general hospital beds added with Hospital Survey and Construction Act assistance have been in places under 10,000 in population; 31 percent in places of from 10,000 to 50,000 population; and 31 percent in metropolitan cities of over 50,000 population. Nearly 600 new projects have been placed in communities which previously had no acceptable hospital. At the other end of the scale, 21 teaching facilities at university medical centers have been assisted in 18 States.

Major emphasis has been placed by State agencies on Hill-Burton assistance to general hospital projects. As of January 1, 1953, general hospital beds added by approved projects amount to 73,168, of a total of 96,428 beds in all types of hospitals. A gradual change in this emphasis for most States appears important, if a reasonable balance between categories of facilities is to be attained.

Value of construction put in place



The hospital survey and construction program makes funds available not only for hospitals but for public health centers. In the Nation to date 377 such projects have been approved. The largest number of these, 283, will serve the 30,000,000 people in the 11 southeastern States. In this region these projects constitute a substantial increase in facilities available for preventive medicine and extend a means of providing for good health at a very moderate outlay. These projects represent a total expenditure of \$28,000,000, or about 2 percent of the estimated total cost of \$1,588,000,000 for all projects assisted through January 1, 1953, by Hospital Survey and Construction Act funds.

Problems Ahead

After 5 years of active operation of this co-operative Federal-State program, problems are emerging which were not at first anticipated. One group of problems involves the technical aspects of setting more precise standards of need:

1. The standard for tuberculosis beds required, as gradually evolved since 1917, is not on a population basis, but is related to the mortality rate. The mortality rate for tuberculosis continued to decline rapidly and dropped to a rate of 20 per 100,000 population for 1951. This is in contrast to a rate of 46 in 1940 and 200 at

the turn of the century. New cases of active tuberculosis, however, continue to be discovered at a rate which is declining very slightly. It now seems clear that new standards based on incidence of active cases should be substituted for the present basis of planning under the act.

2. One of the important innovations in the Hill-Burton inventory is the distinction made between acceptable and nonacceptable beds. For planning purposes, only acceptable beds are recognized as counting against total need. There is still a considerable variation among State plans as to the degree to which nonacceptable beds have been identified and taken into account for planning. As shown by table 1, nonacceptable beds today amount to about 15 percent of all existing beds in the Nation. In some States only a few such beds have been distinguished. Sometimes this arises from the assumption that facilities licensed must be held acceptable, even though there may be substantial public hazards existing. For example, Kentucky and Alabama have recorded only about 0.25 beds per 1,000 population as unacceptable, while Mississippi, Louisiana, and Virginia report 1.5 beds or more per 1,000 population as unacceptable. Three States, Georgia, Kansas, and Connecticut, have recently modified their records by increasing the designation of unacceptable beds very substantially. There is a need for the establishment of practical and comparable minimum standards of acceptability.

3. A third technical problem relates to the role of existing beds for civilians in Federal hospitals. Supporters of the viewpoint that these beds should be included in State hospital plan inventories are increasing. According to last available reports there are existing about 46,000 such general hospital beds for civilians, 55,000 mental hospital beds, and 15,000 tuberculosis hospital beds, which are not now recorded in Hill-Burton plans. These are not distributed uniformly among the States in relation to the population, and cannot all be regarded as reasonably accessible. They still constitute a considerable proportion of the total actual hospital plant. For the present they could probably be added to the record without changing the levels of total need, since many States find

these goals greater than the apparent ability of their people to achieve at this time.

A second group of problems relates to broad policy for standards governing the degree of Federal assistance:

1. The Hospital Survey and Construction Act constitutes a fairly advanced form of grant-in-aid principles. It has the practical effect of producing its maximum program in States of minimum income and greatest need. Various proposals have arisen for modifying this distribution of aid among the States and also for requiring State support in addition to local support.

2. Within most States, there are marked differences among hospital areas in need and financial resources. The present Hospital Survey and Construction Act recognizes this situation. An option is provided which varies the percentage of Federal assistance on specific projects, as an alternate to selecting a single percentage for all projects in any one State. Interest in using this option is increasing, as it facilitates actual construction in remaining areas having acute need and restricted means.

Summary

1. The number of existing hospital beds provides a useful measure of the hospital services available to a community and to the Nation.

2. Continuing inventories and comprehensive State plans under the Hospital Survey and Construction Act of 1946 define total need for hospital beds and indicate a positive construction program.

3. According to these State plans (which do not include Federal beds) the United States on January 1, 1953, had 1,057,000 acceptable hospital beds for civilians, or 56 percent of the total need. The existing national plant for each category of hospital amounted to the following percentages of total need: tuberculosis 77 percent, general 69 percent, mental 56 percent, chronic 14 percent.

4. Marked differences exist among the States, and among the broad socioeconomic regions of the country, in the relative number of hospital beds available per capita. Present resources, or their lack, are closely related to the economic ability of the area.

5. The Hill-Burton program has had a considerable impact, through 5 years of active operation, in beginning to reduce differences in unmet need for beds—locally, by States, and by broad socioeconomic regions. The total dollar value of work put in place with Hill-Burton aid has averaged about one-third of all non-Federal hospital construction. Its distribution has been both rural and urban. Although the actual number of beds for mental and chronic care has increased considerably since 1948, growth in population and the need for replacing obsolete facilities has increased the net deficit of beds needed in these categories. On the other hand, in this period the unmet need for general hospital beds was reduced by one-fourth, and for tuberculosis beds by one-half.

6. Although statewide planning for hospital construction is now accepted practice, through

the encouragement of the Hill-Burton Act, there are still technical problems of defining more precisely the standards of need. Problems also remain, as to the appropriate amount and distribution of financial assistance to local communities, in order to level out deficits in hospital beds and attain facilities for the promotion of adequate health care throughout the Nation.

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Training Courses in Diabetes Control

The Division of Chronic Disease and Tuberculosis, Public Health Service, announces a series of six courses for training in diabetes control to be held at the Diabetes Study and Training Center, Boston, Mass. Designed for public health administrators, physicians, nurses, health educators, dietitians, nutritionists, medical technologists, and medical social workers, the week-long courses will consist of discussions, demonstrations, and field trips, with opportunities for individual consultation. At present only two of the courses have been scheduled. Announcements of the dates of the others will be made periodically.

The courses are as follows:

A diabetes program in public health (September 21-25, 1953). Designed for all categories of public health workers involved in the planning and operation of diabetes public health programs.

Group teaching of patients (May 25-29, October 5-12, November 30-December 4, 1953). Planned primarily for personnel concerned with organizing and conducting group classes for patients with diabetes and their families.

Nursing aspect of a public health diabetes program (dates to be announced). Planned for nursing personnel in health departments, voluntary agencies, hospitals, clinics and industry.

Nutritional aspects of a public health diabetes program (dates to be announced). Planned for dietitians and nutritionists in public and private health agencies and hospitals.

Laboratory aspects of a public health diabetes program (dates to be announced). Intended for medical technologists in health agencies and hospitals who are concerned

with methods of determination and the merits of various blood sugar tests; operation of a mass detection program; and problems associated with the collecting, shipping and storage of blood.

Organization and management of a diabetes clinic (dates to be announced). Planned for personnel concerned with the functioning of a diabetes clinic. The course will be sponsored and given in cooperation with the clinical staff of a large city hospital.

Enrollment in the courses will be limited to 10 persons per course. No registration or tuition fee is required. Further information and application forms may be obtained from the Diabetes Study and Training Center, Public Health Service, 639 Huntington Avenue, Boston 15, Mass. Applications must be received 1 month in advance of date of course.

the turn of the century. New cases of active tuberculosis, however, continue to be discovered at a rate which is declining very slightly. It now seems clear that new standards based on incidence of active cases should be substituted for the present basis of planning under the act.

2. One of the important innovations in the Hill-Burton inventory is the distinction made between acceptable and nonacceptable beds. For planning purposes, only acceptable beds are recognized as counting against total need. There is still a considerable variation among State plans as to the degree to which nonacceptable beds have been identified and taken into account for planning. As shown by table 1, nonacceptable beds today amount to about 15 percent of all existing beds in the Nation. In some States only a few such beds have been distinguished. Sometimes this arises from the assumption that facilities licensed must be held acceptable, even though there may be substantial public hazards existing. For example, Kentucky and Alabama have recorded only about 0.25 beds per 1,000 population as unacceptable, while Mississippi, Louisiana, and Virginia report 1.5 beds or more per 1,000 population as unacceptable. Three States, Georgia, Kansas, and Connecticut, have recently modified their records by increasing the designation of unacceptable beds very substantially. There is a need for the establishment of practical and comparable minimum standards of acceptability.

3. A third technical problem relates to the role of existing beds for civilians in Federal hospitals. Supporters of the viewpoint that these beds should be included in State hospital plan inventories are increasing. According to last available reports there are existing about 46,000 such general hospital beds for civilians, 55,000 mental hospital beds, and 15,000 tuberculosis hospital beds, which are not now recorded in Hill-Burton plans. These are not distributed uniformly among the States in relation to the population, and cannot all be regarded as reasonably accessible. They still constitute a considerable proportion of the total actual hospital plant. For the present they could probably be added to the record without changing the levels of total need, since many States find

these goals greater than the apparent ability of their people to achieve at this time.

A second group of problems relates to broad policy for standards governing the degree of Federal assistance:

1. The Hospital Survey and Construction Act constitutes a fairly advanced form of grant-in-aid principles. It has the practical effect of producing its maximum program in States of minimum income and greatest need. Various proposals have arisen for modifying this distribution of aid among the States and also for requiring State support in addition to local support.

2. Within most States, there are marked differences among hospital areas in need and financial resources. The present Hospital Survey and Construction Act recognizes this situation. An option is provided which varies the percentage of Federal assistance on specific projects, as an alternate to selecting a single percentage for all projects in any one State. Interest in using this option is increasing, as it facilitates actual construction in remaining areas having acute need and restricted means.

Summary

1. The number of existing hospital beds provides a useful measure of the hospital services available to a community and to the Nation.

2. Continuing inventories and comprehensive State plans under the Hospital Survey and Construction Act of 1946 define total need for hospital beds and indicate a positive construction program.

3. According to these State plans (which do not include Federal beds) the United States on January 1, 1953, had 1,057,000 acceptable hospital beds for civilians, or 56 percent of the total need. The existing national plant for each category of hospital amounted to the following percentages of total need: tuberculosis 77 percent, general 69 percent, mental 56 percent, chronic 14 percent.

4. Marked differences exist among the States, and among the broad socioeconomic regions of the country, in the relative number of hospital beds available per capita. Present resources, or their lack, are closely related to the economic ability of the area.

Table 1. Number of States with statutes empowering State and local authorities to issue rules, regulations, orders, and pass ordinances

Authority	Rules		Regulations		Orders		Ordinances	
	General application	Limited application ¹	General application	Limited application ¹	General application	Limited application ¹	General application	Limited application ¹
State legislature-----	2	-----	2	-----	2	-----	1	-----
State board of health-----	35	4	37	7	21	3	-----	1
State health officer-----	15	7	13	7	13	8	-----	-----
Local legislative body-----	14	7	18	12	4	1	28	14
Local board of health-----	31	9	32	8	28	3	6	5
Local health officer-----	7	7	5	8	22	5	2	1
Local health department-----	2	2	2	2	3	3	-----	-----

¹ Refers to States having statutes applicable only to some types of governmental areas or to specific matters.

matters. Local health officers in slightly more than half the States have authority to issue orders; local legislative bodies in most States may pass ordinances; and in slightly less than half the States the legislative body may also issue rules; in 30 States local legislative bodies may prescribe regulations. The State legislature rarely has the power to issue rules, regulations, and orders pertaining to public health. Likewise, local health departments very seldom have such authority. One State has a regulation which permits the State board of health to

issue rules and orders. One other State permits local health officers to issue orders by practice without any statutory provision.

State and local boards of health and State and local health officers most frequently are charged by law with the enforcement of State laws, regulations, and orders pertaining to public health (table 2). There are a few States in which the enforcement powers of the State board of health and the State health officer extend to local laws, regulations, orders, and ordinances. From half to three-fourths of the

Table 2. Number of States with statutes empowering State and local authorities to enforce laws, regulations, orders, and ordinances

Authority	Laws		Regulations		Orders		Ordinances	
	General application	Limited application ¹	General application	Limited application ¹	General application	Limited application ¹	General application	Limited application ¹
State								
State board of health-----	26	2	30	3	20	2	-----	-----
State health officer-----	34	3	31	3	24	1	-----	-----
Local legislative body-----	5	3	5	3	2	2	-----	-----
Local board of health-----	26	7	29	6	22	4	-----	-----
Local health officer-----	33	5	34	9	22	2	-----	-----
Local								
State board of health-----	8	-----	8	-----	8	-----	7	-----
State health officer-----	4	-----	4	-----	5	-----	5	-----
Local legislative body-----	7	7	7	7	6	4	11	9
Local board of health-----	22	4	32	6	23	2	25	7
Local health officer-----	29	2	32	5	31	1	28	3

¹ Refers to States having statutes applicable only to some types of governmental areas or to specific matters.

States permit local health officers or local boards of health to enforce local laws, regulations, orders or ordinances. Local legislative bodies infrequently have powers of enforcement. In many States the matters pertaining to public health are primarily enforced by local police officials and by public prosecutors with the health authorities' only responsibility being that of making the charge or complaint.

Delegation of Public Health Powers

The majority of States delegate their powers with respect to public health to local areas—at least in some matters (table 3). As many as 32 States delegate powers by statute to local health officers and 27 States make such delegations to local boards of health. Additional States delegate powers by practice without statutory authority. In at least some of the States the delegation of power is limited in that the State board of health or health officer retains supervisory authority. One State law prohibits this delegation of power.

All but two States give the State health authority the power to act in the absence of a local health department, or upon failure of the local health department to take action. In one of the two States without such power, the State assumes this responsibility by practice. In six States, however, this power is restricted to certain areas of responsibility, such as epidemic disease prevention or control.

Specific Powers of Local Authorities

In only a few States do local health officers and boards of health have power of subpena, or

Table 3. Number of States delegating public health powers to local health officers, boards of health, and health departments¹

Authority delegated power	Power delegated by	
	Statute	Practice
Local health officer.....	32 (7)	2
Local board of health.....	27 (4)	3
Local health department.....	11 (2)	3

¹ Figures in parentheses indicate the number of States included in the tabulation in which provision is applicable only to certain governmental areas or only under certain conditions.

Table 4. Number of States granting by statute or practice specific powers to local health officers or local boards of health

Specific powers	General application		Limited application ¹	
	Statute	Practice	Statute	Practice
<i>Local health officers</i>				
Subpena.....	2	-----	-----	-----
Administer oaths.....	3	-----	1	-----
Issue injunctions.....	3	1	-----	-----
Issue licenses.....	4	1	2	1
Conduct hearings.....	5	1	4	-----
<i>Local boards of health</i>				
Subpena.....	3	1	2	-----
Administer oaths.....	4	-----	4	-----
Issue injunctions.....	4	-----	2	-----
Issue licenses.....	6	3	4	1
Conduct hearings.....	6	5	6	1

¹ Number of States in which power is limited to some governmental areas or to some public health matters.

power to administer oaths, to issue injunctions, to conduct hearings, or to issue licenses. Most generally, authorization for such action is provided by statutes as indicated in table 4. Local boards of health are given such powers about twice as often as local health officers. Frequently these powers are applicable only to certain local governmental areas and occasionally are applicable only with respect to certain public health matters. There are no regulations pertaining to these specific powers.

Table 5 lists several additional specific powers and indicates the number of States in which the State board of health, local boards of health, local health officers, and local legislative bodies are vested with these powers. The power of isolation and quarantine predominantly rests with State and local boards of health and local health officers. Nearly all States have statutory provisions for isolation and quarantine of communicable disease cases, but in some States such statutes are limited in their application to certain areas or may be invoked only under certain conditions. Local legislative bodies in slightly more than one-quarter of the States possess powers of isolation and quarantine for communicable diseases.

In almost all States the State board of health and local health officers have statutory power to make investigations and inspections, and, in at least three-fourths of the States, local boards of health also have such powers. Local legislative bodies in only six States have the statutory power of investigation and inspection with respect to public health matters.

Slightly less than three-fourths of the States have provisions of law permitting State and local boards of health and local health officers to abate public health nuisances. Nearly half the States have statutes granting this power to local legislative bodies, although these statutes are frequently limited to certain types of local areas or to certain types of nuisances.

Nearly three-fourths of the States have statutes which permit the State board of health to forbid gatherings in the interest of public health. More than half the States have laws granting local health officers this power, and nearly half the States grant such power to local boards of health. Local legislative bodies infrequently possess the authority to forbid public gatherings in the interest of public health.

All but two State boards of health have the power to collect vital statistics and disease reports either by statute or by statute and regulation. In Massachusetts the power to collect vital statistics reposes in the office of the secretary of State, and in New York the State health

officer has the power to collect vital statistics and disease reports. In addition, local health officers have power to collect vital statistics in 24 States and disease reports in 34 States. Local boards of health have power by statute to collect vital statistics in 12 States and statutory power to collect disease reports in 23 States with regulations supplementing statutory power in 1 State. These two powers are almost never given to local legislative bodies.

The power to initiate court actions and defend health departments against court actions is given to local health officers in 15 States, to the State board of health in 26 States, to local boards of health in 18, and to local legislative bodies in 6. In addition, this power is exercised by practice by the State board of health in 1 State, local boards of health in 1 State, local legislative bodies in 2, and local health officers in 1.

Judicial review of actions of local boards of health or local health officers is authorized by law in 25 States. It is done by practice in 11 others, and is authorized by practice only for cities in 1 State. Judicial review of the action of health officials is specifically prohibited by law under certain circumstances in 2 States and not commonly done in 9 other States wherein the law is silent on the matter. One State failed to supply information on this item.

Table 5. Number of States granting certain specific powers by statute or by statute and regulation to the State board of health, local boards of health, local legislative bodies, and local health officers¹

Power granted	State board of health		Local board of health		Local legislative body		Local health officer	
	Statute only	Statute and regulation	Statute only	Statute and regulation	Statute only	Statute and regulation	Statute only	Statute and regulation
Isolate and quarantine.....	39 (6)	4 (1)	37 (2)	3 (1)	13 (4)	3 (1)	40 (7)	3
Investigate and inspect.....	40 (6)	3	36 (5)	1	² 6 (2)	1	40 (3)	3
Abate nuisances.....	32 (7)	1	34 (3)	1	21 (10)	2 (2)	31 (6)	2
Forbid gatherings.....	33 (8)	1 (1)	² 23 (4)	-----	8 (1)	-----	28 (3)	1
Collect vital statistics.....	44 (11)	2 (1)	12 (4)	-----	4 (1)	-----	23 (6)	1
Require disease reports.....	44 (9)	2	22 (2)	1	2	-----	31 (5)	3 (1)
Initiate and defend court action.....	² 26 (2)	-----	² 18 (3)	-----	² 6 (3)	-----	² 15 (3)	-----

¹ Figures in parentheses indicate number of States included in the tabulation in which provision is applicable only to certain governmental areas or only under certain conditions.

² In one additional State this power is exercised by practice without statutory provision.

Summary

Data from the survey of State laws, regulations, and practices pertaining to the duties and powers of State and local boards of health, health officers, and health departments indicate that the power to pass public health laws and to issue regulations, rules, and orders generally rests with State and local boards of health and less frequently with State health officers, State or local legislative bodies, or local health officers. Authority to enforce State public health laws and regulations is generally assigned to State and local health officers; the enforcement of local laws and regulations is primarily the legal responsibility of local boards of health and health officers.

States generally delegate their public health powers to local boards of health, health officers, and local health departments. Almost all State health authorities have the power to act in the absence of local health departments, or upon the failure of local authority to take action.

Less than three-fourths of the States provide for judicial review of decisions made by boards of health or health officers.

Local health officers and local boards of health infrequently possess the power of subpoena, power to administer oaths, to issue injunctions, to conduct hearings, or to issue licenses.

Many State boards of health, as well as local boards of health and health officers, have the power to require isolation and quarantine of communicable diseases; to make investigations and inspections; to abate nuisances; to forbid gatherings in the interest of public health; to collect vital statistics; or to require disease reports. On the other hand, fewer of them have the power to institute court action or to defend their actions in the courts.

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Achievements in World Health

In carrying out its constitutional role as "coordinating and directing authority in international health," the World Health Organization has made notable contributions toward the development of better health everywhere. Outstanding achievements during 1952 were summarized in an information kit, "Health Is Wealth," prepared by the Public Health Service in observance of World Health Day, 1953, as follows:

It gave direct technical aid to more than 100 governments and territories.

It made effective, on October 1, 1952, the new International Sanitary Regulations, designed to facilitate international travel and trade.

It took over, with the United Nations International Children's Emergency Fund,

responsibility for continuing the BCG anti-tuberculosis vaccination programs after the official end of the 1951 international campaign.

It maintained an international epidemic-warning service, continued to coordinate worldwide influenza research activities, and operated a tuberculosis research office and several brucellosis centers.

It provided emergency aid for several governments faced with epidemics and refugee health problems.

It recruited, for the United Nations Reconstruction Agency, a team of experts which visited Korea to work out a long-term plan for improving health and medical care, in addition to the technicians working on civilian health programs in South Korea.

An Experiment With Group Conferences For Weight Reduction

By A. L. CHAPMAN, M.D.

Ten overweight women in Alexandria, Va., who participated in group conferences on weight control, lost an average of 17.8 pounds each over a 20-week period. The entire class lost an average of 42.7 percent in excess weight, ranging from 13.5 to 131.5 percent. Weekly conferences were held between March 29 and August 25, 1952, at the Alexandria City Health Department.

Free discussion, centering first on nutritional and psychological orientation and later on self-analysis, was the guiding principle of the conferences. Losing a pound a week until the ideal weight was approximated was selected as each participant's arbitrary goal.

It was repeatedly emphasized that medical supervision of the group members was the sole responsibility of their own physicians. The group leader conducted the conference in such a way that the women would be motivated to decrease their caloric intake. Loyalty in attendance was stressed more than weight loss because it was believed that continued attendance eventually would bring about sufficient motivation to achieve weight reduction. At no time did a spirit of compulsion to lose weight prevail.

Amounts Lost

Four of the 10 women lost weight from the beginning and continued to lose at a rate of more than a pound a week. They were so well motivated that they lost 25, 27, 27, and 25 pounds, respectively, or 131.5, 93.1, 38.8, and 104.1 percent of excess weight. They never

seemed unduly upset by the need to restrict their diets.

The other six members found weight reduction more difficult. They needed special attention from the rest of the group, from the consultants, and from the leader. They seemed to resist decisions that might entail dietary restrictions and manufactured excuses when they failed to lose weight as fast as they had hoped. Eventually, one by one they submitted to the interest of the group and belatedly began to acknowledge the inevitability of eating less food if they truly wanted to lose weight.

Four members, told by their own physicians that they had low basal metabolic rates, lost 7, 13, 14, and 25 pounds, respectively, or 36.8, 43.3, 13.5, and 93.1 percent of their excess weight. The woman losing 93.1 percent of her excess weight reported that her dietary intake had to be cut to a low level to achieve this substantial reduction. One woman with heart disease lost 12 pounds. Her percentage of excess weight loss was 24.0.

Methods

Decreased caloric intake was stressed during the first four sessions until a significant degree of weight reduction was achieved. From then on every effort was made to help members include the protective food substances and an adequate amount of protein in their diets.

A weight chart was prepared for each member. A line was drawn on the chart, starting at the current weight of the individual and declining at a rate of one pound a week for 20 weeks. Weights were taken before every meeting and recorded on the charts. In this way, each woman had a graphic record of whether she was losing her weekly pound or going in debt to the group. The charts revealed the members who were having the most difficulty controlling their appetites and who needed encouragement from the more successful members.

Early in the series, each one was asked to name the food item in her diet which she believed to be the worst offender from the standpoint of obesity. Bread, cake, pie, candy, ice cream, soft drinks, and sugar and cream in coffee were mentioned. Each woman pointed to one or two of these foods as significant in

Dr. Chapman, Public Health Service medical director for Region III, formerly was chief of the Division of Chronic Disease in the Bureau of State Services, Public Health Service.

From Michigan comes an informal account of another effort at weight control using the group method. This was self-generated by group members, sparked by a housewife who was stimulated by reading an article in a popular magazine of national circulation. The housewife writes:

"We now have a thriving class of 18 women who have shed 91 pounds as of our fourth meeting. Just as in the reports of other groups, we have our well-motivated, steady losers, some who are running into real difficulty restricting themselves, and one who has steadily gained since joining our class. She is our unmarried member, a teenager 40 pounds too heavy, working in her father's candy store!

"We have enlisted the help of the State department of health, which has offered materials, personnel, and even a meeting place should we need it. Also, the director of the State department of mental health is going to pay us a visit. We plan some tape-recording exchanges to further our understanding of the problem. Pamphlets and films have been used as background material and as diet guides.

"Sources of therapeutic help are limited here. We have no county health doctor, and we hesitate to ask one of our terribly busy private physicians to assume advisership, so each member has depended on her own doctor for advice. I have a short interview with some doctor each week about some of the problems that come up."

causing her own overweight condition. Great stress was placed on discussing the nonfattening substitutes for high caloric foods.

Each woman was then asked to forego indefinitely the one food which she believed to be the chief cause of her own obesity. As a result, the class got off to an encouraging start, which did much to convince the group that overweight is caused by overeating, and that it is controllable. Every member except one with hypothyroidism lost weight by the end of the first week. She lost 3 pounds during the first 2 weeks.

For several weeks, members were encouraged to keep diet records to help them understand the magnitude of their caloric intake. Many women fail to realize the amount of calories accumulated by their habit of eating frequently throughout the day. It soon became obvious that several women were consciously or unconsciously omitting food items from their diet records. As the weeks passed and group confidence increased, the daily records became more accurate.

Education

Educational efforts were limited to imparting simple and basic nutritional concepts. The Metropolitan Life Insurance Co. booklet "Overweight and Underweight" was read aloud by the class. As each paragraph was read, its contents were discussed. Questions brought up were usually answered by members of the group. Three films, "Losing to Win," "Proof of the Pudding," and "Weight Reduction through Diet" were shown at opportune intervals.

Upon the expressed wishes of the members, special consultants were invited to participate in the discussions. On two occasions, a public health physician, trained in nutrition, discussed basic food elements and protective food substances. On another, a psychiatrist attended and developed a discussion on self-analysis, which was continued at two following conferences when a psychiatric social worker was present. Late in the course, a nutritionist explained how to plan menus in terms of food portions rather than in terms of grams. She also discussed individual dietary problems.

When the subject of self-analysis was introduced, several papers on the emotional components of obesity and personality traits of obese people were read and discussed freely. The group showed little or no resentment to the viewpoints expressed in the papers but instead seemed willing, often anxious, to translate the verities contained in them to other members of the group in terms of their own experiences.

Mortality in the United States, 1900–1950

BY TAVIA GORDON

DURING THE LATE eighteenth and nineteenth centuries, death rates for the western world were slowly moving downward. Great pestilential epidemics swept across Europe and North America during this period, but by the beginning of the twentieth century it was evident that the application of discoveries by the pioneer bacteriologists and epidemiologists had brought about a substantial control of these recurrent scourges, and pointed the way to a further reduction in mortality.

Only the most optimistic, however, could have foreseen the reduction that actually occurred during the next 50 years. In 1900, the first year for which the Bureau of the Census received death records from the States, the death rate for the District of Columbia and the 10 States submitting records was 17.2 per 1,000 population. By 1950, the rate was at a record low of 9.6 per 1,000 for the entire United States, a reduction of 44 percent. The increase in medical knowledge, the more general availability of medical care, improvements in environmental sanitation, and the vigorous prosecution of public health programs all contributed to this phenomenal improvement. In addition, the rise in the standard of living and changes in the character of certain diseases played important roles in this decline.

Infectious Diseases

These factors proved most effective in the control of some infectious diseases. The sharp decline in mortality for diarrhea and related

diseases, shown in figure 1 as "specified gastrointestinal diseases," probably was mainly due to improved sanitation. The death rate for these causes declined 96 percent between 1900 and 1950, from 154.7 deaths per 100,000 population to 6.2 per 100,000. At the same time, typhoid fever almost completely disappeared as a cause of death. Protection of water and milk supplies and better sewage disposal facilities in cities and many rural areas led to a decline in typhoid fever incidence. The death rate fell from 31.3 in 1900 to 0.1 per 100,000 in 1950.

Mortality for the communicable diseases of childhood fell sharply between 1900 and 1950. This has been attributed to such factors as changes in the character of some of these diseases, more regular medical care for infants and children, widespread immunization programs, and the steady improvement in diet and hygiene. By 1950 death rates for diphtheria, measles, whooping cough, and scarlet fever had declined to a small fraction of their values at the beginning of the century (figs. 2 and 3). In 1900, this group of diseases was responsible for 242.6 deaths per 100,000 children under 15. In 1950, these diseases together caused fewer than 5 deaths for every 100,000 children.

Infant and Maternal Mortality

From the early part of this century, the medical and public health professions made special efforts to reduce the risks surrounding birth and infancy, and the decline in deaths under 1 year of age was truly impressive. Between 1915, when the birth-registration area was established, and 1950, the infant mortality rate declined from 99.9 deaths under 1 year of age per 1,000 live births to 29.2.

Mr. Gordon is an analytical statistician with the mortality analysis branch, National Office of Vital Statistics of the Public Health Service.

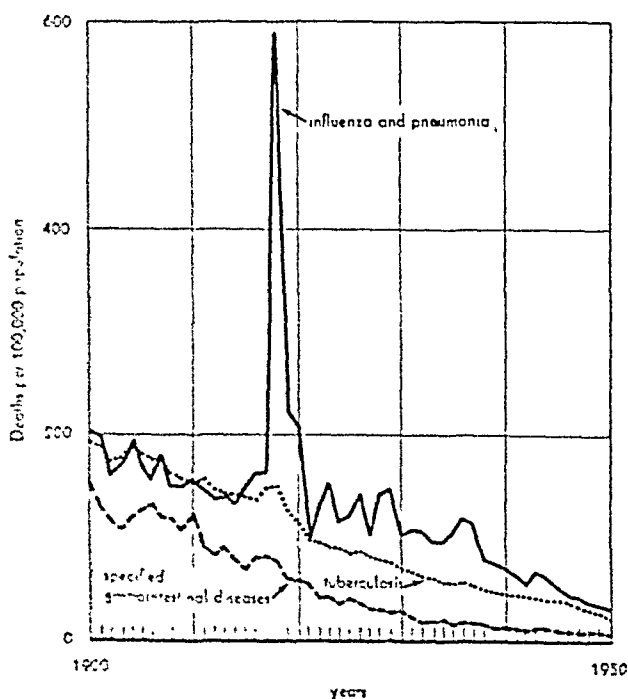
The maternal mortality rate, which did not respond as readily to the efforts to safeguard childbirth, remained high until the 1930's. At that time it began a slow decline, which accelerated rapidly after 1936 as a result of the combined impact of the studies of medical committees on maternal mortality, the discovery of the antibiotics, and improved techniques to control hemorrhage.

Tuberculosis, Influenza and Pneumonia

By 1950, the major causes of death remaining among infectious diseases were tuberculosis and influenza and pneumonia. Mortality declined more slowly for these causes than for the other infectious diseases shown in figures 1, 2, and 3, but the rate of decline accelerated in the late 1940's.

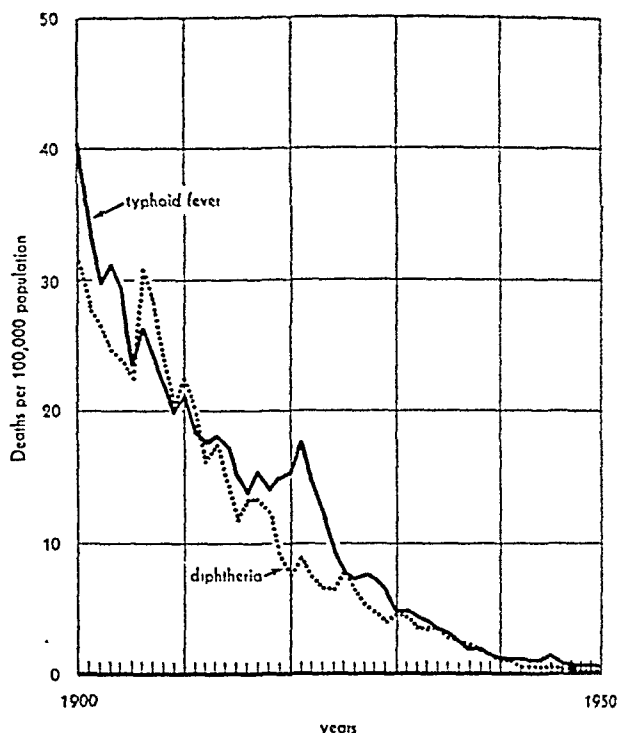
The tuberculosis death rate decreased by as great a percentage between 1945 and 1950 as it had in the preceding 15 years. The death rate of 40 per 100,000 in 1945 was nearly halved by 1950, reaching the low of 22.5 per 100,000 popu-

Figure 1. Death rates for specified gastrointestinal diseases, tuberculosis (all forms) and influenza and pneumonia: death-registration States, 1900-1950.



NOTE: "Specified gastrointestinal diseases" includes dysentery, all forms; gastritis, duodenitis, enteritis, and colitis; and diarrhea of the newborn.

Figure 2. Death rates for diphtheria and typhoid fever: death-registration States, 1900-1950.



lation, and estimates for 1951 and 1952 indicate that this rapid decline is continuing. Part of the recent change may be the result of the cumulative effect of hospitalization and medical care programs. Since tuberculosis appears to have been responsive to improvements in the standard of living over many decades, the general prosperity of the last 10 years may have also contributed to the recent trend.

With the introduction of sulfonamide and antibiotic therapy, which provided the first effective medical treatment for certain types of pneumonia, the death rate for influenza and pneumonia fell rapidly (fig. 1). Between 1900 and 1937, the death rate for these causes fluctuated widely, but it never fell below 95.7 per 100,000. In 1918, the year of the great influenza pandemic, influenza and pneumonia caused 588 deaths per 100,000 population.

During the 5 years before the introduction of sulfa therapy, 1932-37, the median death rate for influenza and pneumonia was 104.2 per 100,000. The rate dropped in 1938 to 80.4. In subsequent years mortality for these causes continued to decline rapidly. In 1950, the death rate for influenza and pneumonia was

31.3 per 100,000. It remains to be seen, however, how permanent this reduction will be.

The new therapy responsible for these recent changes constitutes a major event in the history of medicine, even though its immediate effect on the total death rate has not been very great. Some of its most dramatic results have been demonstrated for certain diseases of great virulence, like Rocky Mountain spotted fever, psittacosis, plague, and typhus fever, and in a further reduction in death rates for the common infectious diseases. It contributes a powerful reinforcement in the treatment of infectious diseases and in reducing their severity.

Accidents and Chronic Diseases

Not all the changes in mortality since 1900 have been favorable. In 1900, motor vehicle accidents were not even distinguished as a cause of death in the cause lists then current. Since that time motor vehicles and motor vehicle fatalities have become increasingly common. In 1950, the death rate for motor vehicle accidents was 23.1 per 100,000—higher than the death rate for tuberculosis. The mortality for other

Figure 3. Death rates for whooping cough, measles, and scarlet fever: death-registration States, 1900–1950.

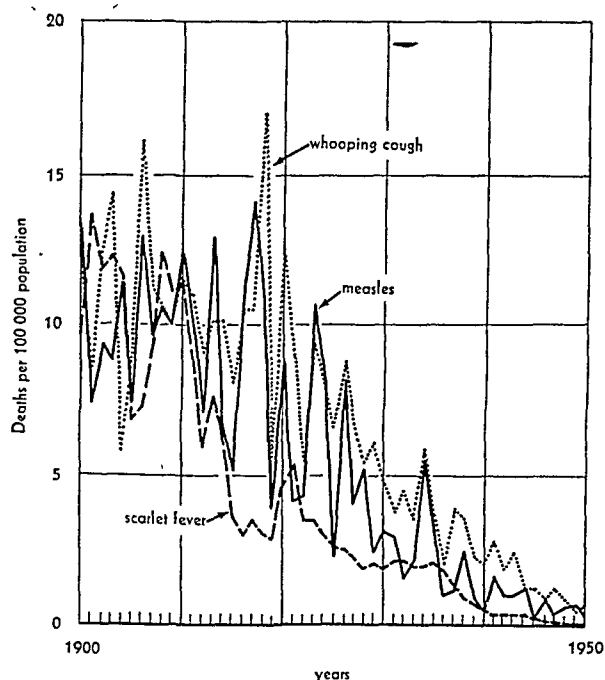
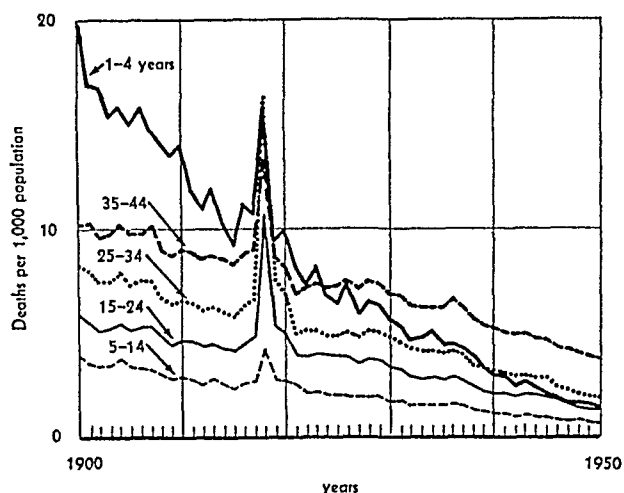


Figure 4. Death rates for the younger ages: death-registration States, 1900–1950.



accidents, however, declined during this period from 72.3 deaths per 100,000 in 1900 to 37.5 in 1950.

The chronic diseases as a whole did not show a decreasing mortality in this period, so that as the death rates fell for the infectious diseases the chronic diseases increased in relative importance. In 1900, the cardiovascular-renal diseases and malignant neoplasms accounted for only 24 percent of the recorded deaths. In 1950, 68 percent of all deaths were ascribed to these two groups of causes.

Mortality by Age

Each cause of death has a characteristic age distribution. Consequently, a reduction in mortality for specific causes affects the death rate for the various ages by differing amounts. The infectious diseases were the preponderating causes of death for the younger age groups in 1900. The radical reduction in mortality for these diseases, therefore, had its most marked effect on the death rates at the younger ages and progressively less effect for each older age group. For children aged 1 to 4 years, the death rate dropped from 19.8 per 1,000 in 1900 to 1.4 per 1,000 in 1950, a decrease of 93 percent; the decrease for the age group 35–44 in this period was 65 percent (fig. 4).

Mortality in the older age groups, for which the major causes of death are the chronic diseases, showed decreases of considerably less

magnitude. The death rate for the age group 45 to 54 years decreased 43 percent, from a rate of 17 per 1,000 in 1900 to 8.5 in 1950, and the indicated rate of decrease was smaller for each older age group. For the ages above 85, where the reporting of data is recognized to be unreliable, it is doubtful if any real change in the death rate occurred between 1900 and 1950.

Comparisons With Other Countries

Since the radical decline in mortality during this century has not been confined to the United States, it is instructive to compare our position in 1950 with the position of three other nations with low age-specific mortality rates—England

Death rates by age, for selected countries, 1950

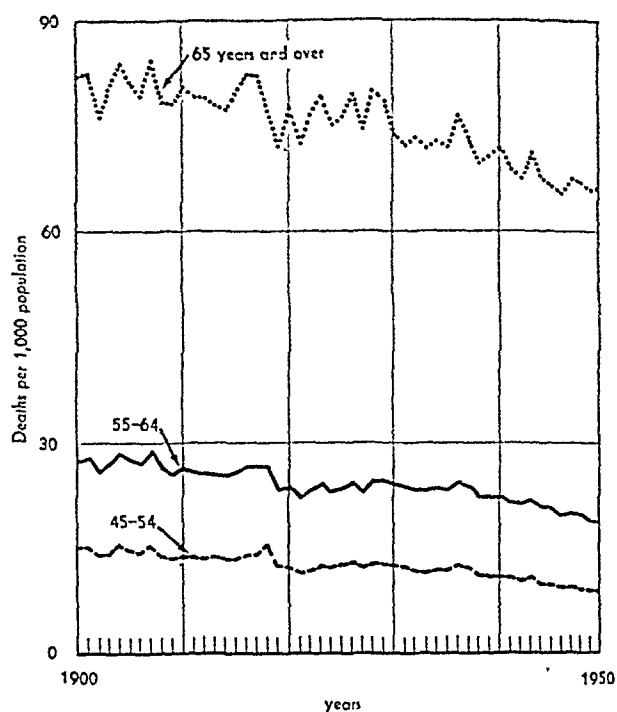
[Exclusive of fetal deaths; rates per 1,000 population in each specified group]

Age in years	United States ¹	Netherlands ²	England and Wales ³	New Zealand ⁴ (exclusive of Maoris)
All ages.....	9.6	7.5	11.6	9.3
Under 1.....	33.0	25.3	29.8	23.3
1-4.....	1.4	1.6	1.4	1.2
5-9.....	.6	.6	.6	.5
10-14.....	.6	.4	.5	.5
15-19.....	1.1	.7	.9	1.0
20-24.....	1.5	1.0	1.2	1.2
25-29.....	1.6	1.1	1.5	1.0
30-34.....	2.0	1.2	1.7	1.5
35-39.....	2.8	1.6	2.1	2.1
40-44.....	4.4	2.4	3.1	2.7
45-49.....	6.8	3.8	5.3	4.9
50-54.....	10.4	6.2	8.3	7.5
55-59.....	15.6	9.4	13.2	12.6
60-64.....	23.3	15.6	21.3	19.3
65-69.....	33.3	26.7	33.6	31.6
70-74.....	51.5	45.2	54.3	48.7
75-79.....	93.3	77.5	89.8	117.2
80-84.....		129.6	141.8	
85 and over.....	202.0	226.8	227.6	

¹ Exclusive of deaths among armed forces overseas. Rates based on population enumerated as of April 1, 1950. ² Data relate to the de jure population. ³ Excluding deaths among armed forces outside country. ⁴ Excluding armed forces outside country and alien forces within country.

Source: For countries other than the United States, Demographic Yearbook, United Nations, 1952.

Figure 5. Death rates for the older ages: death-registration States, 1900-1950.



and Wales, the Netherlands, and New Zealand. For the age groups between 1 and 15, the death rates for the United States are about the same as those for other countries. For each succeeding age group the comparison becomes less favorable, and for the age groups from 35 to 65 years the death rate for the United States is higher than that shown for the other countries in the table. In short, the United States has advanced to a position of very favorable mortality for the young ages but not for the older ages.

As the second half of the twentieth century opens, major reductions in mortality rates must come through control of accidents and the chronic diseases. This does not necessarily require another medical revolution similar to that which occurred for the infectious diseases. The experience of other countries demonstrates that a substantially lower mortality for the older ages is possible, even at the present level of medical knowledge.

Milk Sanitation Honor Roll for 1951-52

Seventy-two communities have been added to the Public Health Service "honor roll" of safe milk communities, and 35 communities on the previous list have been dropped. This revision covers the period from January 1, 1951, to December 31, 1952, and includes a total of 239 cities and 56 counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation contained in the Milk Ordinance and Code Recommended by the United States Public Health Service. The State milk sanitation authorities concerned report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk is sold.

The recommended milk ordinance, which forms the basis for the milk

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing, with a summary of rules under which a community is included, was published in Public Health Reports, September 1952, pp. 914-916. The rating method was described in Public Health Reports 53: 1386 (1938) Reprint No. 1970.

sanitation ratings, is now in effect through voluntary adoption in 397 counties and 1,548 municipalities. The ordinance has been adopted as regulation by 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect state-wide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordi-

nance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were over 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1951-52

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Alabama</i>		<i>Colorado—Continued</i>		<i>Georgia—Continued</i>	
Auburn.....	9-19-1951	Grand Junction.....	4-25-1952	West Point.....	6-22-1951
Birmingham - Jefferson County.....	7-26-1952	Pueblo.....	8-1-1951	<i>Illinois</i>	
Gadsden-Etowah County.....	8-8-1952	Weld County.....	4-11-1952	Chicago.....	8-1-1951
Montgomery.....	5-22-1952	<i>Georgia</i>		<i>Indiana</i>	
Opelika.....	6-19-1952	Albany.....	5-15-1952	Bedford-Orleans.....	10-1-1951
<i>Arkansas</i>		Athens.....	4-10-1952	Bloomington.....	11-26-1952
Fort Smith.....	10-19-1952	Atlanta.....	11-21-1951	Bluffton.....	1-1-1952
<i>Colorado</i>		Cairo.....	5-31-1951	Cooperative Grade A Milk Program:	9-1-1952
Colorado Springs.....	6-6-1951	Calhoun.....	2-15-1951	Holland	
Denver City and Coun- ty.....	11-27-1951	Columbus.....	3-30-1951	Huntingburg	
		La Grange.....	6-25-1951	Jasper	
		Quitman.....	5-30-1951	Elkhart.....	11-1-1952
		Valdosta.....	5-13-1952		
		Waycross.....	10-23-1951		

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1951-52—Continued

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Indiana—Continued</i>		<i>Mississippi—Continued</i>		<i>North Carolina—Continued</i>	
Evansville.....	10- 1951	Corinth.....	6- 6-1951	New Hanover County..	6-10-1952
Fort Wayne.....	11- 1951	Eupora.....	3-28-1952	Orange County.....	7- 3-1952
Indianapolis.....	10-31-1952	Greenville.....	8-25-1952	Randolph County.....	3- 9-1951
Madison.....	7- 1952	Greenwood.....	4-15-1952	Richmond County....	5-29-1951
Marion and Gas City..	4- 1951	Grenada.....	1-22-1952	Scotland County.....	5-31-1951
Peru.....	8-27-1952	Houston.....	5-31-1951	Swain County.....	1-17-1952
Rushville.....	8- 1951	Iuka.....	7-12-1951	Transylvania County..	2- 5-1952
Shelbyville.....	8- 1952	Kosciusko.....	1-31-1952	Yadkin County.....	10- 1-1952
South Bend.....	8-14-1951	Louisville.....	10- 4-1951	Yancey County.....	8-10-1951
Valparaiso.....	8- 1952	Macon.....	6-12-1952		
Vincennes.....	5- 1951	McComb.....	10-25-1951	<i>South Dakota</i>	
		Meridian.....	6-18-1952	Sioux Falls.....	10-25-1952
<i>Iowa</i>		Morton.....	6-17-1952	Vermillion.....	6-12-1952
Des Moines.....	7- 1951	New Albany.....	1- 7-1952		
Dubuque.....	11-14-1952	Okolona.....	5-29-1951	<i>Tennessee</i>	
Mason City.....	10- 3-1952	Ruleville.....	4-13-1952	Athens.....	7-16-1952
		Starkville.....	11-27-1951	Bristol.....	10-19-1951
<i>Kansas</i>		State College.....	11-27-1951	Chattanooga.....	11-13-1952
Dodge City.....	4-11-1951	Tupelo.....	4-20-1951	Cleveland.....	10- 1-1952
Erie.....	5- 1-1951	Vicksburg.....	6-13-1952	Clinton.....	11-28-1951
Hillsboro.....	11- 7-1952	Winona.....	1-24-1952	Columbia.....	5-22-1952
				Cookeville.....	11-14-1951
<i>Kentucky</i>		<i>Missouri</i>		Cowan.....	10-17-1952
Bowling Green.....	4-17-1952	St. Joseph.....	6-14-1951	Dandridge.....	9-17-1951
Calloway County....	2-15-1952	Springfield.....	2-20-1952	Decherd.....	10-17-1952
Campbell County....				Erwin.....	10-15-1951
Newport.....	11-28-1951	<i>Nebraska</i>		Fayetteville.....	6-27-1951
Christian County....	12-20-1951	Grand Island.....	9-18-1952	Franklin.....	6- 6-1952
Graves County.....	2- 7-1952			Gallatin.....	5-11-1951
Louisville and Jefferson		<i>Nevada</i>		Greenville.....	4-17-1952
County.....	5-23-1952	Yerington.....	12-5-1951	Jefferson City.....	9-25-1951
McCracken County..	2-13-1952			Johnson City.....	8-27-1952
Owensboro.....	8- 6-1952	<i>North Carolina</i>		Kingsport.....	10-23-1951
Paris.....	5-17-1951	Alleghany County....	9-10-1952	Knoxville.....	8-22-1951
Warren County.....	4-17-1952	Burke County.....	6-28-1951	Lebanon.....	8- 1-1952
		Charlotte.....	1-11-1952	Lewisburg.....	6-12-1952
<i>Louisiana</i>		Cumberland County..	2-15-1952	Loudon.....	4- 3-1952
New Orleans.....	12- 6-1951	Davie County.....	10- 1-1952	Manchester.....	10-17-1952
Vernilion Parish....	9- 9-1951	Durham County.....	7-18-1952	Memphis.....	6- 5-1951
		Edgecombe County		Morristown.....	9-25-1951
<i>Mississippi</i>		(excluding Rocky		Nashville and David-	
Aberdeen.....	10-26-1951	Mount).....	7-16-1952	son County.....	11- 5-1951
Amory.....	10-25-1951	Forsyth County....	7-16-1952	Newport.....	9-18-1951
Belmont.....	7-12-1951	Guilford County....	8- 6-1952	Paris.....	4-18-1951
Booneville.....	9-28-1951	Henderson County..	2- 5-1952	Pulaski.....	5-24-1951
Brookhaven.....	3-11-1952	High Point.....	2-16-1951	Rogersville.....	4-21-1952
Canton.....	10- 1-1952	Jackson County....	1-17-1952	Shelbyville.....	6-11-1952
Clarksdale.....	9-25-1952	Lincoln County....	3-19-1952	Sweetwater.....	5- 8-1951
Cleveland.....	9- 3-1952	Mars Hill.....	1- 4-1952	Tullahoma.....	9-16-1952
Columbia.....	7-17-1952	Mitchell County....	8-10-1951	Winchester.....	10-17-1952
Columbus.....	8-13-1951				

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1951-52—Continued

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Texas</i>		<i>Texas—Continued</i>		<i>Virginia—Continued</i>	
Commerce.....	9- 2-1952	San Antonio.....	11-20-1951	Front Royal.....	8-29-1951
Corsicana.....	8- 6-1952	San Benito.....	8- 1-1951	Lexington.....	5- 8-1951
Dallas.....	4-26-1951	San Juan.....	8-23-1951	Luray.....	8-29-1951
El Paso.....	10-21-1952	Texarkana.....	7- 2-1952	Narrows.....	8- 8-1952
Falfurrias.....	1-12-1951	Texas City.....	1-16-1951	Norfolk.....	9- 5-1952
Galveston.....	12-11-1951	Tyler.....	10- 9-1951	Pearisburg.....	8- 8-1952
Gladewater.....	7-26-1952	Victoria.....	7-24-1952	Pulaski.....	8- 7-1952
Harlingen.....	8- 4-1951	Waxahachie.....	9-30-1952	Radford.....	8- 7-1952
Houston.....	6-11-1952	Weslaco.....	8-24-1951	Richmond.....	5-21-1952
Kerrville.....	7-31-1952	Wichita Falls.....	4-10-1952	Roanoke.....	9-19-1952
Kilgore.....	7-26-1952			Staunton.....	11- 7-1952
La Feria.....	8- 2-1951	<i>Utah</i>		Suffolk.....	9-26-1952
Lamesa.....	5-10-1951	Logan.....	5-14-1952	Waynesboro.....	8- 3-1951
Levelland.....	5- 9-1951	Minersville.....	1-25-1951		
Lufkin.....	10- 8-1951	Ogden.....	12-11-1951	<i>Washington</i>	
Mercedes.....	8-21-1951	Salt Lake City.....	4-29-1952	Cowlitz County.....	10-12-1951
Mission.....	8-24-1951			Everett.....	6-14-1951
Mt. Pleasant.....	9-24-1952	<i>Virginia</i>		Spokane.....	9-25-1952
Orange.....	1- 6-1952	Abingdon.....	10-19-1951	Whitman County.....	6-19-1952
Pharr.....	8-22-1951	Blacksburg.....	8- 7-1952		
Port Arthur.....	10-17-1951	Bristol.....	10-19-1951	<i>Wisconsin</i>	
		Buena Vista.....	5- 8-1951	Madison.....	10- 5-1951

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating
<i>Alabama</i>		<i>Kansas</i>		<i>North Carolina—Continued</i>	
Clanton, 87.2.....	5-12-1952	Neodesha, 85.....	3-14-1951	Cabarrus County, 80.3..	1-15-1952
Huntsville, 98.....	8-10-1951	Pittsburg, 98.....	1-17-1952	Caldwell County, 88.7..	10-29-1951
Lanett, 97.8.....	11- 6-1952			Halifax County, 83.4..	4-10-1952
<i>Georgia</i>		<i>Kentucky</i>		Kings Mountain, 83.8..	8-18-1952
Brunswick-Glynn		Lexington and Fayette		Macon County, 91.5..	11- 7-1952
County, 96.....	11- 6-1952	County, 97.....	4-28-1952	Montgomery County,	
Camilla, 78.....	5-30-1951			93.1.....	3-22-1951
Carrollton, 94.2.....	3-14-1952	<i>Louisiana</i>		Polk County, 87.5.....	6-18-1952
Cartersville, 97.....	12-11-1952	Iberia Parish, 96.....	5- 3-1951	Robeson County, 96.6..	2-15-1952
Cedartown, 98.3.....	3-11-1952			Shelby, 74.4.....	6- 6-1952
Dalton-Whitfield		<i>Mississippi</i>		Wilkes County, 90.6..	9-20-1951
County, 83.3.....	4- 4-1951	Gulfport, 98.....	4-30-1952		
Gainesville-Hall		Hattiesburg, 96.....	7-31-1952	<i>Oregon</i>	
County, 93.1.....	3-21-1952	Jackson, 98.6.....	9-11-1952	Salem, 99.7.....	7-15-1952
Macon, 98.6.....	6-15-1951	Laurel, 93.6.....	8-13-1952		
Newnan, 94.7.....	6- 5-1952	West Point, 97.6.....	7-18-1951	<i>South Carolina</i>	
Thomaston, 81.7.....	4-30-1952			Spartanburg and Spar-	
Thomasville, 99.4.....	5-29-1951	<i>Montana</i>		tanburg County,	
		Missoula, 99.4.....	9- 1-1952	91.3.....	10-31-1951
<i>Indiana</i>		<i>North Carolina</i>		<i>Tennessee</i>	
Michigan City, 98.1....	7- 1-1951	Ashe County, 78.7....	9- 9-1952	Alcoa, 99.5.....	9-17-1952
		Buncombe County,		Harriman, 90.6.....	7-26-1951
		95.8.....	6-15-1951	Maryville, 99.5.....	9-17-1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1951-52—Continued

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Indiana—Continued</i>		<i>Mississippi—Continued</i>		<i>North Carolina—Continued</i>	
Evansville.....	10- 1951	Corinth.....	6- 6-1951	New Hanover County..	6-10-1952
Fort Wayne.....	11- 1951	Eupora.....	3-28-1952	Orange County.....	7- 3-1952
Indianapolis.....	10-31-1952	Greenville.....	8-25-1952	Randolph County.....	3- 9-1951
Madison.....	7- 1952	Greenwood.....	4-15-1952	Richmond County.....	5-29-1951
Marion and Gas City..	4- 1951	Grenada.....	1-22-1952	Scotland County.....	5-31-1951
Pera.....	8-27-1952	Houston.....	5-31-1951	Swain County.....	1-17-1952
Rushville.....	8- 1951	Iuka.....	7-12-1951	Transylvania County..	2- 5-1952
Shelbyville.....	8- 1952	Kosciusko.....	1-31-1952	Yadkin County.....	10- 1-1952
South Bend.....	8-14-1951	Louisville.....	10- 4-1951	Yancey County.....	8-10-1951
Valparaiso.....	8- 1952	Macon.....	6-12-1952		
Vincennes.....	5- 1951	McComb.....	10-25-1951	<i>South Dakota</i>	
		Meridian.....	6-18-1952	Sioux Falls.....	10-25-1952
<i>Iowa</i>		Morton.....	6-17-1952	Vermillion.....	6-12-1952
Des Moines.....	7- 1951	New Albany.....	1- 7-1952		
Dubuque.....	11-14-1952	Okolona.....	5-29-1951	<i>Tennessee</i>	
Mason City.....	10- 3-1952	Ruleville.....	4-13-1952	Athens.....	7-16-1952
		Starkville.....	11-27-1951	Bristol.....	10-19-1951
<i>Kansas</i>		State College.....	11-27-1951	Chattanooga.....	11-13-1952
Dodge City.....	4-11-1951	Tupelo.....	4-20-1951	Cleveland.....	10- 1-1952
Eric.....	5- 1-1951	Vicksburg.....	6-13-1952	Clinton.....	11-28-1951
Hillshoro.....	11- 7-1952	Winona.....	1-24-1952	Columbia.....	5-22-1952
				Cookeville.....	11-14-1951
<i>Kentucky</i>		<i>Missouri</i>		Cowan.....	10-17-1952
Bowling Green..	4-17-1952	St. Joseph.....	6-14-1951	Dandridge.....	9-17-1951
Calloway County....	2-15-1952	Springfield.....	2-20-1952	Decherd.....	10-17-1952
Campbell County..				Erwin.....	10-15-1951
Newport.....	11-28-1951	<i>Nebraska</i>		Fayetteville.....	6-27-1951
Christian County..	12-20-1951	Grand Island.....	9-18-1952	Franklin.....	6- 6-1952
Graves County.....	2- 7-1952			Gallatin.....	5-11-1951
Louisville and Jefferson		<i>Nevada</i>		Greenville.....	4-17-1952
County.....	5-23-1952	Yerington.....	12-5-1951	Jefferson City.....	9-25-1951
McCracken County..	2-13-1952			Johnson City.....	8-27-1952
Owensboro.....	8- 6-1952	<i>North Carolina</i>		Kingsport.....	10-23-1951
Paris.....	5-17-1951	Alleghany County....	9-10-1952	Knoxville.....	8-22-1951
Warren County.....	4-17-1952	Burke County.....	6-28-1951	Lebanon.....	8- 1-1952
		Charlotte.....	1-11-1952	Lewisburg.....	6-12-1952
<i>Louisiana</i>		Cumberland County..	2-15-1952	Loudon.....	4- 3-1952
New Orleans.....	12- 6-1951	Davie County.....	10- 1-1952	Manchester.....	10-17-1952
Vermilion Parish....	9- 9-1951	Durham County.....	7-18-1952	Memphis.....	6- 5-1951
		Edgecombe County		Morristown.....	9-25-1951
<i>Mississippi</i>		(excluding Rocky		Nashville and David-	
Aberdeen.....	10-26-1951	Mount).....	7-16-1952	son County.....	11- 5-1951
Amory.....	10-25-1951	Forsyth County....	7-16-1952	Newport.....	9-18-1951
Belmont.....	7-12-1951	Guilford County.....	8- 6-1952	Paris.....	4-18-1951
Booneville.....	9-28-1951	Henderson County..	2- 5-1952	Pulaski.....	5-24-1951
Brookhaven.....	3-11-1952	High Point.....	2-16-1951	Rogersville.....	4-21-1952
Canton.....	10- 1-1952	Jackson County.....	1-17-1952	Shelbyville.....	6-11-1952
Clarksdale.....	9-25-1952	Lincoln County....	3-19-1952	Springfield.....	5- 8-1951
Cleveland.....	9- 3-1952	Mars Hill.....	1- 4-1952	Sweetwater.....	9-16-1952
Columbia.....	7-17-1952	Mitchell County....	8-10-1951	Tullahoma.....	10-17-1952
Columbus.....	8-13-1951			Winchester.....	10-17-1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1951-52—Continued

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Texas</i>		<i>Texas—Continued</i>		<i>Virginia—Continued</i>	
Commerce.....	9- 2-1952	San Antonio.....	11-20-1951	Front Royal.....	8-29-1951
Corsicana.....	8- 6-1952	San Benito.....	8- 1-1951	Lexington.....	5- 8-1951
Dallas.....	4-26-1951	San Juan.....	8-23-1951	Luray.....	8-29-1951
El Paso.....	10-21-1952	Texarkana.....	7- 2-1952	Narrows.....	8- 8-1952
Falfurrias.....	1-12-1951	Texas City.....	1-16-1951	Norfolk.....	9- 5-1952
Galveston.....	12-11-1951	Tyler.....	10- 9-1951	Pearisburg.....	8- 8-1952
Gladewater.....	7-26-1952	Victoria.....	7-24-1952	Pulaski.....	8- 7-1952
Harlingen.....	8- 4-1951	Waxahachie.....	9-30-1952	Radford.....	8- 7-1952
Houston.....	6-11-1952	Weslaco.....	8-24-1951	Richmond.....	5-21-1952
Kerrville.....	7-31-1952	Wichita Falls.....	4-10-1952	Roanoke.....	9-19-1952
Kilgore.....	7-26-1952			Staunton.....	11- 7-1952
La Feria.....	8- 2-1951	<i>Utah</i>		Suffolk.....	9-26-1952
Lamesa.....	5-10-1951	Logan.....	5-14-1952	Waynesboro.....	8- 3-1951
Levelland.....	5- 9-1951	Minersville.....	1-25-1951		
Lufkin.....	10- 8-1951	Ogden.....	12-11-1951	<i>Washington</i>	
Mercedes.....	8-21-1951	Salt Lake City.....	4-29-1952	Cowlitz County.....	10-12-1951
Mission.....	8-24-1951			Everett.....	6-14-1951
Mt. Pleasant.....	9-24-1952	<i>Virginia</i>		Spokane.....	9-25-1952
Orange.....	1- 6-1952	Abingdon.....	10-19-1951	Whitman County.....	6-19-1952
Pharr.....	8-22-1951	Blacksburg.....	8- 7-1952		
Port Arthur.....	10-17-1951	Bristol.....	10-19-1951	<i>Wisconsin</i>	
		Buena Vista.....	5- 8-1951	Madison.....	10- 5-1951

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating
<i>Alabama</i>		<i>Kansas</i>		<i>North Carolina—Continued</i>	
Clanton, 87.2.....	5-12-1952	Neodesha, 85.....	3-14-1951	Cabarrus County, 80.3..	1-15-1952
Huntsville, 98.....	8-10-1951	Pittsburg, 98.....	1-17-1952	Caldwell County, 88.7..	10-29-1951
Lanett, 97.8.....	11- 6-1952			Halifax County, 83.4..	4-10-1952
<i>Georgia</i>		<i>Kentucky</i>		Kings Mountain, 83.8..	8-18-1952
Brunswick-Glynn County, 96.....	11- 6-1952	Lexington and Fayette County, 97.....	4-28-1952	Macon County, 91.5..	11- 7-1952
Camilla, 78.....	5-30-1951			Montgomery County, 93.1.....	3-22-1951
Carrollton, 94.2.....	3-14-1952	<i>Louisiana</i>		Polk County, 87.5.....	6-18-1952
Cartersville, 97.....	12-11-1952	Iberia Parish, 96.....	5- 3-1951	Robeson County, 96.6..	2-15-1952
Cedartown, 98.3.....	3-11-1952			Shelby, 74.4.....	6- 6-1952
Dalton-Whitfield County, 83.3.....	4- 4-1951	<i>Mississippi</i>		Wilkes County, 90.6..	9-20-1951
Gainesville-Hall County, 93.1.....	3-21-1952	Gulfport, 98.....	4-30-1952		
Macon, 98.6.....	6-15-1951	Hattiesburg, 96.....	7-31-1952	<i>Oregon</i>	
Newnan, 94.7.....	6- 5-1952	Jackson, 98.6.....	9-11-1952	Salem, 99.7.....	7-15-1952
Thomaston, 81.7.....	4-30-1952	Laurel, 93.6.....	8-13-1952		
Thomasville, 99.4.....	5-29-1951	West Point, 97.6.....	7-18-1951	<i>South Carolina</i>	
<i>Indiana</i>		<i>Montana</i>		Spartanburg and Spartanburg County, 91.3.....	10-31-1951
Michigan City, 98.1....	7.....1951	Missoula, 99.4.....	9.....1952		
		<i>North Carolina</i>		<i>Tennessee</i>	
		Ashe County, 78.7....	9- 9-1952	Alcoa, 99.5.....	9-17-1952
		Buncombe County, 95.8.....	6-15-1951	Harriman, 90.6.....	7-26-1951
				Maryville, 99.5.....	9-17-1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1951-52—Continued

BOTH RAW AND PASTEURIZED MARKET MILK—Continued

Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating
<i>Tennessee—Continued</i>		<i>Texas—Continued</i>		<i>Virginia</i>	
McMinnville, 95.3.....	5- 7-1952	Gilmer, 94.4.....	1-29-1952	Harrisonburg, 96.....	11-12-1952
Murfreesboro, 98.7.....	7- 6-1951	Greenville, 98.....	9-27-1952	Lynchburg, 98.2.....	6-22-1951
		Henderson, 94.....	1-31-1952	<i>Washington</i>	
		Laredo, 80.....	9-18-1952	Seattle-King County,	
<i>Texas</i>		Longview, 99.4.....	7-26-1952	99.9.....	6-1951
Amarillo, 95.....	7-23-1951	Lubbock, 99.....	8-25-1952	Tacoma, 99.7.....	8-13-1952
Austin, 97.3.....	10-24-1951	Marshall, 87.2.....	10- 3-1952	<i>West Virginia</i>	
Brenham, 94.9.....	7-26-1951	McAllen, 99.....	8-22-1951	Clay County, 88.....	
Brownsville, 92.7.....	8- 1-1951	Palestine, 88.8.....	1-15-1952	Kanawha County, 96..	
Cleburne, 95.5.....	7-31-1952	Paris, 92.3.....	9-26-1951	Nicholas County, 55..	
Edinburg, 93.8.....	8-28-1951	Sherman, 93.3.....	11- 6-1951		
Fort Worth, 99.97....	2-12-1952				

Note: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90-percent or more compli-

ance with the grade A raw milk communities listed. This percentage is requirements of the Milk Ordinance an important factor to consider in and Code Recommended by the estimating the safety of a city's milk United States Public Health Service supply. All milk should be pasteurized, either commercially or at home. Note particularly the percentage of milk pasteurized in the various communities before it is consumed.

Immunization Information for International Travel

A summary of the changes made in immunization requirements from May 31, 1951 through January 1953, is given in a supplement to the booklet Immunization Information for International Travel, issued in May 1951.

Additional copies of the supplement may be obtained from the Division of Foreign Quarantine. The booklet and the supplement are available to Public Health Service personnel through regular supply channels. They may be purchased from

the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 15 cents for the two. On orders of 100 or more of the supplement and booklet, delivered at the same address, a discount of 25 percent is allowed.

State and local health departments and facilities of the Public Health Service are informed of official changes in immunization requirements through "Quarantine Measures" in the weekly Communicable Disease Summary.

A Facility for Use Of Radioactive Isotopes In a General Hospital

GENERAL HOSPITALS more and more are becoming a point of use of radioactive isotopes for certain clinical tests and for treatment of selected patients. The unique characteristics of radioactive substances as employed in medical practice make necessary the planning and development of a special area to accommodate their use in the general hospital.

Based on established knowledge of the hazards associated with the use of radioactive isotopes, and on current experience in operating units, the Public Health Service, in cooperation with the Atomic Energy Commission and other authorities, has developed guide material for use in designing a radioactive isotope area in a general hospital.

Plan of the Area

The minimum, basic, adequate facility for use of radioactive isotopes in the hospital consists of two rooms: a radiochemistry laboratory and a patient uptake-measuring room (see plan on page 450).

In the radiochemistry laboratory, the shipments of radioactive isotopes are received and stored and the proper dilutions for patient dosage are prepared. Here also, clinical specimens are prepared for examination, the doses of isotopes are given to patients, and glassware, linens, clinical specimens, and other items contaminated with radioactive isotopes are cleaned,

held for decay of radioactivity, or stored prior to disposition.

The plan incorporates such elementary design features as: equipment located on the side walls, permitting window space with heating outlets below; separate work tops for patient dose and clinical specimen preparation: high level radiation area and isotope storage (see "hoods 7" and "13" on drawing) on an outside wall, far removed from radiation measurement area; separation from patient uptake-measuring room by a corridor to minimize disturbance of radiation measurements caused by storage of stock solutions of radioactive isotopes.

In the patient uptake-measuring room, the radioactive content of clinical specimens is determined and the patient uptake of radioactive substance is measured. The room is divided into three areas: waiting, clerical, and clinical.

This basic, 2-room facility should provide for a patient load of about 60 patients a month. On the assumption that not more than 2 or 3 patients are receiving radioactive gold-198, it is equipped for a maximum of 10 patients in a working day.

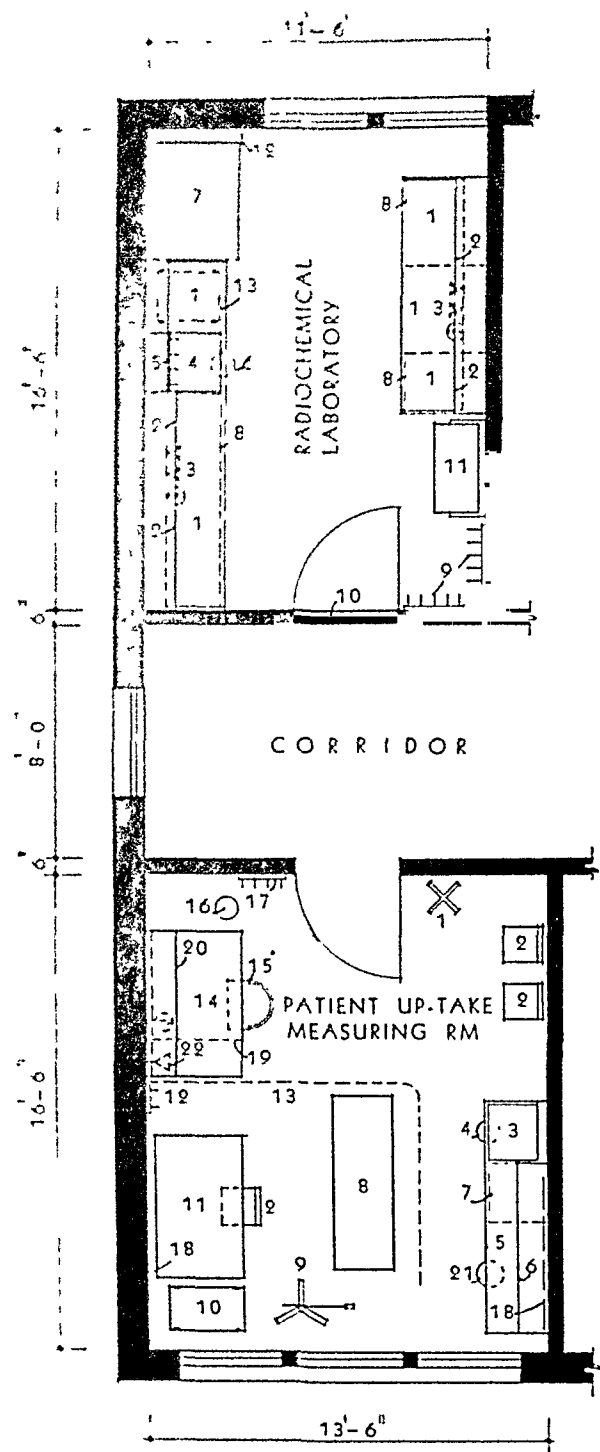
As the use of radioactive isotopes will probably increase, the hospital should plan for economical expansion of the isotope area. By adding a second patient uptake-measuring room, the hospital can double the patient capacity of this basic facility.

Design and Operation

Design and construction of the radioactive isotope area must provide for necessary radiation shielding to maintain personnel exposures below 0.3 roentgen a week, for preparation of patient doses of isotopes, for ease of cleanup whenever radioactive material is accidentally spilled, and for measurement of the patient's absorption of isotopes.

In operating radioactive isotope facilities, continued vigilance is necessary to protect personnel against excessive radiation exposures and to assure that work areas are free from contamination. Personnel exposures should be monitored by use of film badges or pocket radiation dosimeters to be worn at all times the individual is in the area. Work areas should be

The guide material was developed by W. R. Taylor, hospital architect, Division of Hospital Facilities, and Samuel C. Ingraham, M. D., Division of Engineering Resources, Public Health Service. Technical details are given in the December 1952 issues of Hospitals (p. 74) and Architectural Record (p. 181).



Radiochemical Laboratory

1. Work top with splash back.
2. Wall cabinets.
3. Air, gas, and electric outlets.
4. Sink, foot, knee, or elbow controls for hot and cold water, plus one cold-water hand-controlled outlet.
5. Peg board.
6. Contaminated waste receptacle under sink.
7. Fume hood.
8. Cabinets below.
9. Hook strip.
10. Bright yellow flush threshold to indicate radiation hazard zone.
11. Paper-roll holder 48 inches above floor.
12. Metal closure plate.
13. Isotope storage below work top, on dolly.

Patient Uptake-Measuring Room

1. Costumer.
2. Straight chair.
3. Sink, foot, knee, or elbow controls.
4. Contaminated waste receptacle.
5. Work top.
6. Wall cabinets.
7. Cabinet below work top 24 inches wide.
8. Examination table.
9. Tube stand on casters.
10. Dolly.
11. Table.
12. Hook strip for patients' clothes.
13. Curtain rod and curtain.
14. Stenographer's desk.
15. Stenographer's chair.
16. Waste paper receptacle.
17. Hook strip for staff.
18. Constant voltage plug-in strip.
19. Record file.
20. Book shelf above desk.
21. Stool.
22. Telephone outlet.

monitored regularly by use of radiation survey instruments suitable for detecting possible contamination of furniture, walls, and floors.

Hospitals planning the use of radioactive isotopes for the first time should consult the

Isotopes Division of the Atomic Energy Commission, Oak Ridge, Tenn., to learn the requirements and regulations governing qualification for use of radioactive isotopes for human applications.

Organized Health Services in A County of the United States

Several years ago a cooperative project was undertaken by the Monongalia County Health Department in West Virginia and the Public Health Service to survey the structure and function of all organized health services having an impact on the people of one rural county. It was the first such study made. The report was mimeographed and had limited distribution, but demand for it was great so it was printed in this present form.

The report covers in detail all agencies in the county which provide health services, types of service and administrative structure of each, source of support of their operations, and extent of service. The scope of activity includes preventive disease services, medical care, and research and training. The summary and discussion considers the historical backgrounds, local-State-national relationships, and the role of the health department.

At the end of January 1949, there were in Monongalia County 155 different agencies with organized health services. These agencies fall into the general categories: official and voluntary health agencies, other official agencies with health functions, voluntary social agencies with health functions, health service enterprises, health functions of industry and labor, professional and auxiliary organizations, and civil and social groups with health functions. The largest number of these agencies was supported by tax funds and the next largest group by individual members.

An analysis of the quantitative data in the report indicates that far greater sums were spent on medical care than on prevention of disease. Individual categorical programs, such as services for veterans, workmen's compensation cases, or sanatorium care for tuberculosis, involved greater expenditures than the

entire appropriation for the county health department from all local sources.

Official health agencies were responsible for the greatest volume of services and expenditures relating to prevention of disease, and other official health agencies with health functions had a large share in school health services, safety, food and drug control, nutrition, and industrial and adult health. Voluntary agencies played a major role in tuberculosis and chronic disease control, and in health education. Of the medical care programs, the largest in the county were those for company employees covered by prepayment plans, especially miners and their dependents, and those for veterans. Organized efforts for hospitalization have been greatest for special classes of service under the medical care programs. The greatest financial weight of the special illnesses has been for tuberculosis.

Services of the programs for preventive disease and medical care under government agencies tended to exceed those provided by the voluntary agencies, particularly those for crippled children. On the other hand, in many spheres of health and community activity in which government has not participated, those of the voluntary agencies and economic enterprises were of the greatest significance.

Roemer, Milton I., and Wilson, Ethel A.: *Organized Health Services in a County of the United States*. (Public Health Service Publication No. 197) 1952. 91 pages. 45 cents.

Tuberculosis Beds in Hospitals and Sanatoria January 1, 1952

There are in the United States and Territories 1,122 institutions which provide 111,505 beds for the care of tuberculosis, according to the seventh annual edition of the *Index of Hospitals and Sanatoria with Tuberculosis Beds in the United States and Territories*. Of these, 1,006 hospitals are local (State, city, county, and district), and 116 are

operated by the Federal Government. In the continental United States alone there are 1,097 institutions, 982 of which are locally operated and 115, federally operated.

Comparison with the 1951 index reveals that 373 institutions previously unreported appear in the latest edition of this report. Only 7 of these are new facilities. Also, 26 institutions which were reported in the earlier index are deleted from the present edition and reasons for these deletions given.

The information in the 1952 index was gathered by means of a post-card questionnaire sent to all the locally operated hospitals. Data are analyzed as to type of hospital and ownership and control, and are compared with data in the 1951 report. The hospitals are indexed by State, with the number of beds given for each institution.

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Tuberculosis Beds in Hospitals and Sanatoria, January 1, 1952. (Public Health Service Publication No. 253) 1952. 32 pages; tables. Available upon request to Division of Chronic Disease and Tuberculosis, Public Health Service, Washington 25, D. C.

The Head Nurse Looks at Her Job

The continuing shortage of nurses is one of the most acute problems in medical care today. Even the most successful recruitment programs cannot supply graduate nurses fast enough to keep pace with the demands for their services. These factors indicate a need for hospitals to evaluate the utilization of professional nursing personnel and to determine whether or not administrative changes might save personnel time and hospital dollars.

This manual, developed by the Division of Nursing Resources of the Public Health Service, offers a method by which hospitals of all sizes may determine how head nurse time is distributed between patient care management duties and duties which could be performed by less skilled nursing personnel. It was developed for use in units providing

1-to-100 care to patients in general and allied special hospitals.

The method described consists of observations of head nurse activities in one or more units for a period of two or more full days during which detailed time records are kept. An observer "shadows" the head nurse and assistant head nurse at all times while they are on duty and records the time, the area of activity and the level of skill required for each task performed. The recorded data are coded according to area and level and later tabulated and analyzed for use in determining what corrective action may be needed and how to initiate it.

The manual outlines the procedures for such a study and is in loose-leaf format to facilitate its use during the training period before a study as well as during the study itself. Detailed instructions are given for observers, including the classification of activity areas and levels. Suggestions are given for constructing the record forms and the manner in which data are to be recorded and analyzed. The appendix also includes two training narratives to assist in the teaching of observers.

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Gillan, Ruth I., Tibbitts, Helen G., and Sutherland, Dorothy. *The Head Nurse Looks at Her Job. A Manual for Studying Head Nurse Activities in Hospitals.* (Public Health Service Publication No. 227) 1952. 77 pages; illustrated. 40 cents.

For the general public

Arthritis and Rheumatism

Arthritis is man's oldest known chronic affliction and is the world's leading crippler. About 7½ million Americans suffer from arthritis and rheumatism, and 1 million of those are permanently disabled. The prevalent forms of these diseases—rheumatoid arthritis, osteoarthritis, rheumatic fever, gout, and fibrositis—are discussed in this health information leaflet. The information given includes suspected causes,

symptoms, effect on various parts of the body, and treatment.

Readers are warned against self-treatment. They are urged to seek a physician's advice if suffering pain, stiffness, or swelling in the joints, for early treatment by a physician benefits the majority of rheumatic patients and often prevents disability.

Attention is called to the work of three organizations on arthritis and rheumatism. The American Rheumatism Association, the Arthritis and Rheumatism Foundation, and the National Institute of Arthritis and Metabolic Diseases of the Public Health Service are working co-operatively to increase the understanding and improve the treatment of arthritis and rheumatism.

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Arthritis and Rheumatism. Health Information Series, No. 9 (Public Health Service Publication No. 29) revised 1952. 2-fold leaflet. 5 cents; \$2 per 100 copies.

Importance of Nutrition To Good Health

This leaflet was prepared in response to frequent requests for nutrition information which could not be satisfactorily referred to other Federal agencies. The introduction stresses the importance of good nutrition for good health and the need for proper diet to prevent fatigue at work and play and to avoid lowered resistance to infection. A physician's advice is suggested if a special diet is needed.

The leaflet describes the important food elements, and how they are used in the body. Foods containing the various elements are listed in the margins of the pages. The vitamins are discussed in the same manner, with a description of each, what it does for the body, and the foods in which it is found. A brief section on calories is included. Reference is made to a chart showing food values and calories, obtainable from the U. S. Department of Agriculture, and to other source material.

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Importance of Nutrition to Good Health. Health Information Se-

ries No. 31 (Public Health Service Publication No. 162) 1952. 12 pages; illustrated. 5 cents. \$3.75 per 100.

Diabetes

About 2 persons out of every 100 have diabetes mellitus, according to recent surveys, and about half of them do not know they have it. The disease can develop in persons from all age groups, but those over 40, those with diabetes in their families, and those who are overweight are most likely to have it.

These facts are brought out in this health information leaflet which discusses diabetes, its cause, and the manner in which it is controlled. The functions of the pancreas, the results of its malfunctioning, and the symptoms of diabetes are described. The information given also includes the tests by which the disease can be detected and the methods of controlling it through the use of bottled insulin, dietary restrictions, and proper exercise. It is pointed out that because of the increasing numbers of persons over 45, diabetes is more common than formerly. However, since it can be discovered and treated successfully, no one need be handicapped by diabetes.

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Diabetes. Health Information Series No. 70 (Public Health Service Publication No. 137) November 1952. 2-fold leaflet. 5 cents; \$4.00 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Poliomyelitis Distribution in the United States

By ROBERT E. SERFLING, Ph.D., and IDA L. SHERMAN, M.S.

IN THE EARLY summer of 1894 inhabitants of the Otter Creek Valley in western Vermont became aware of a strange paralytic disease in their community. It seemed to select younger children as particular victims although a few adults were also affected. This first notable epidemic of poliomyelitis in the United States was carefully investigated by Dr. C. S. Caverly, president, Vermont State Board of Health. His field studies, constituting a classic model of "shoe-leather" epidemiology, mark the beginning of our modern knowledge of poliomyelitis. In the following years other investigations conducted in the Caverly pattern demonstrated the extensive distribution of the disease and indicated the need for systematic morbidity reporting.

Massachusetts, in 1907, was the first State (1) to require notification of all cases of poliomyelitis. In 1910, the Surgeon General of the Public Health Service requested all States to submit reports on poliomyelitis for 1909 and 1910. This initiated national reporting of poliomyelitis, although regular inclusion of reports from all States was not achieved until about 1922. Since that time a large body of data has accumulated, forming an increasingly comprehensive base for continuing analyses of elementary epidemiological characteristics, such as secular trends, geographic distribution, and seasonal variation. A number of excellent analyses have been published (2, 3, 4, 5), but

the most recent include only the years through 1946 in the United States (6, 7). Sabin (8) reviewed epidemiological characteristics of a number of poliomyelitis outbreaks throughout the world.

Certain epidemiological characteristics of poliomyelitis have changed with time. In the United States, annual rates both of reported cases and of deaths have shown an upward trend, particularly during the past decade. In earlier decades a lower incidence was observed in southern States than in northern States. This difference is less apparent in recent years.

Continuing studies and analysis of these elementary epidemiological characteristics and their changes are indicated for any infectious disease that remains as a serious problem in the country. Furthermore, discovery of the value of gamma globulin in the prophylaxis of poliomyelitis (9, 10) poses difficult problems as to the best way to utilize available supplies.

The fullest possible knowledge of the current epidemiological pattern of poliomyelitis as revealed by morbidity and mortality reports may be useful in guiding administrative decisions. For these reasons the present paper has been prepared. The past history of poliomyelitis as recorded in published literature and official reports was reviewed and special attention was given the period 1932 to 1952 with particular emphasis on changing patterns of the past 5 to 10 years.

Dr. Serfling and Mrs. Sherman are chief and assistant chief, respectively, of the statistics section, epidemiology branch, Communicable Disease Center, Public Health Service, Atlanta, Ga.

National Incidence

The trend of the national case and death rates in the United States during the period 1910-52, is shown in figure 1. Since both cases and

death were not reported from the same group of States during earlier years, the rates in figure 1 were based on reports from those States which reported both cases and deaths. The record of national incidence of poliomyelitis in the United States falls naturally into four periods:

1. Prior to 1909, when information on incidence, except for a few States, depended on descriptive accounts in the epidemiological literature.

2. From 1909-16, when published reports were available from some States. These were supplemented by special studies of Lavinder, Freeman, and Frost, and their summaries give more complete information on the period.

3. From 1917 through the epidemic year 1931, during which time reporting gradually became more complete. By the middle 1920's most States were reporting annually.

4. From 1932 until the present, during which time national reporting of both cases and deaths has been essentially complete. Because of the obvious differences which characterize national reporting in the different periods, they are presented separately in this discussion.

Early Years

During the 1894 outbreak in Vermont, Caverly collected information on 132 cases. Of these, 119 had shown paralysis, 7 had died before paralysis was noted, and 6, although exhibiting symptoms characteristic of early stages of the illness, had not developed paralysis. In Rutland, the largest community in the affected area, 55 of the 12,000 inhabitants had been stricken—an attack rate of 460 cases per 100,000 population. In nearby Proctor, a town of 2,000 persons, 27 cases had occurred. The remaining 50 cases were scattered through a dozen small communities in the area.

Two years later, in a final report of his investigations (11), Caverly concluded that the disease was "epidemic poliomyelitis," possibly a variant form of the "infantile paralysis" which in the United States had been known principally as an endemic disease of relatively infrequent occurrence.

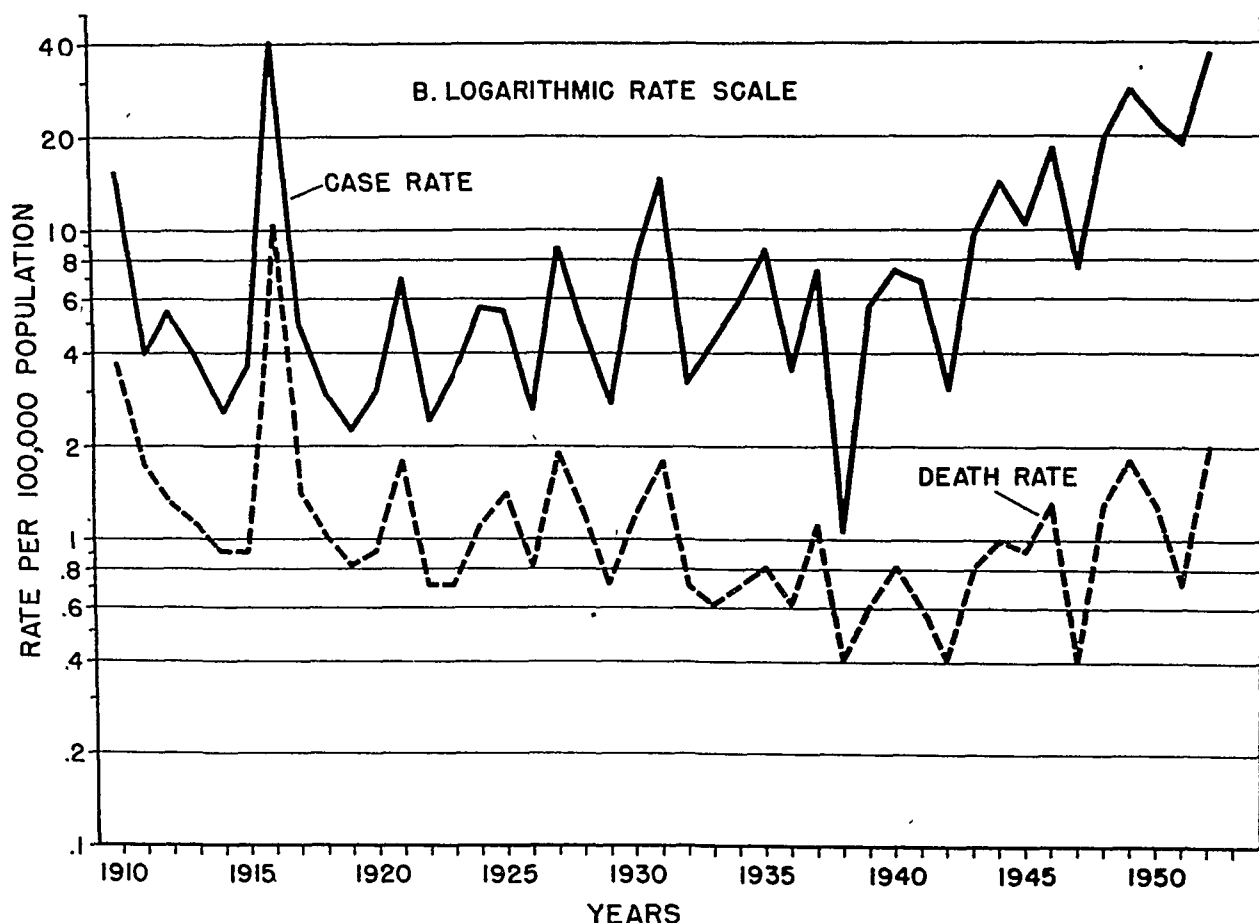
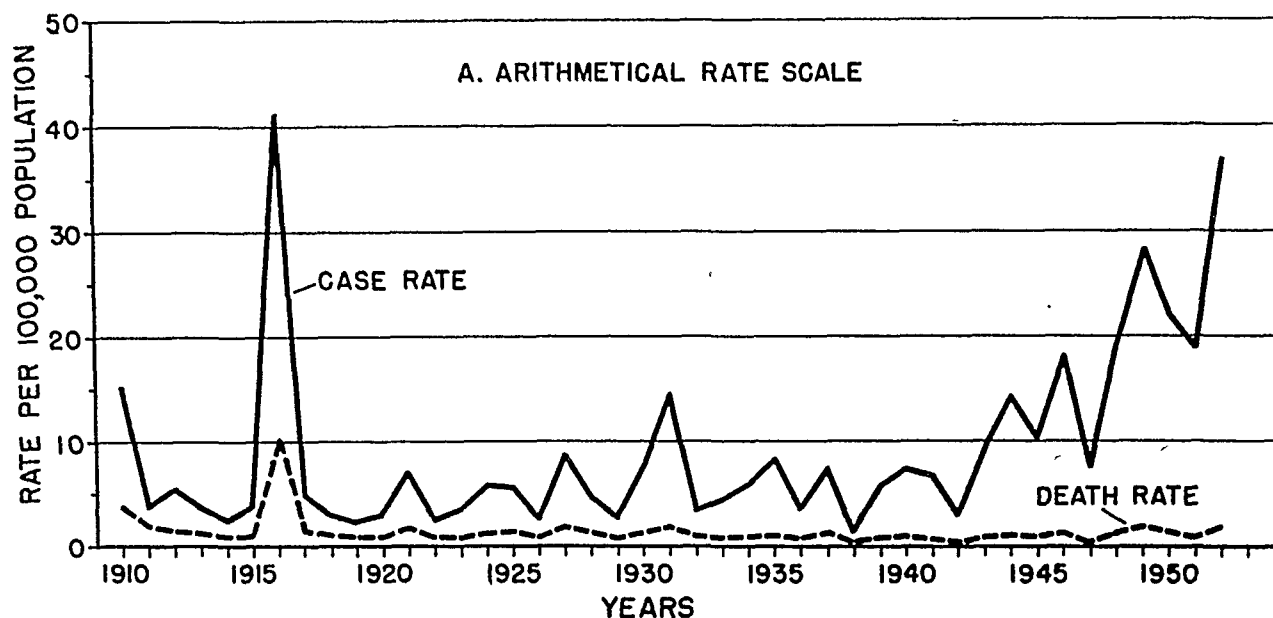
In the succeeding years similar outbreaks occurred with increasing frequency in many parts of the country. In 1908 two papers (12, 13)

summarized accounts of 17 poliomyelitis epidemics in the United States and others throughout the world. By this time, outbreaks had been described in Alabama, California, Florida, Illinois, Maine, Massachusetts, Michigan, Missouri, New York, Pennsylvania, and Wisconsin. These seem generally to have been of smaller scale than the Rutland episode.

In New York City, however, the 1907 outbreak was the largest then recorded in any place. The impact led to an extensive retrospective investigation initiated in October of 1907. The study (14) was conducted by mail and produced detailed information on 752 cases. It was estimated that in all, about 2,500 cases had occurred. Although cases were somewhat concentrated on the east side of Manhattan, the epidemic had extended northward to Poughkeepsie and throughout the western end of Long Island. The case fatality was estimated to be 5-7 percent, about half that of the Rutland outbreak.

In Massachusetts, where smaller outbreaks had been noticed since 1893, incidence was also high in 1907 and the State made poliomyelitis a reportable disease. In 1908, 136 cases were reported in Massachusetts (1). In midwestern Minnesota, 150 cases were recorded, and in Wisconsin, 408. In the following year, 1909, a great outbreak struck in Nebraska. Description of this epidemic (15) was also based on a retrospective study. In answers to letters, 58 physicians reported 999 cases in 18 counties. The greatest number of cases, 384, was reported from Polk County, with a population of 10,000. Douglas County (1910 population, 168,546) reported 79 cases, a rate slightly less than 50 per 100,000 population, and comparable to that of the New York City epidemic of 1907. In 1910 Massachusetts reported 845 cases, Pennsylvania 1,112, and in the midwest, Minnesota and Iowa each recorded more than 600 cases. In the far west, nearly 400 cases occurred in the State of Washington. On August 9 of that year (1910) the Surgeon General of the Public Health Service initiated the request that started national reporting of poliomyelitis. In the same year provision was also made for separate classification of poliomyelitis deaths in the national vital statistics summary.

Figure 1. Annual poliomyelitis case and death rates in States reporting both cases and deaths, United States, 1910-52.



SOURCES: Cases, 1910-50—Public Health Service: The Notifiable Diseases (Pub. Health Rep. Supp.). 1951—National Office of Vital Statistics: Reported Incidence of Notifiable Diseases in the United States, 1951, Annual Supplement to Weekly Morbidity Report, vol. 2, No. 53, 1953. 1952—National Office of Vital Statistics: Morbidity and Mortality Weekly Report, vol. 1, Nos. 1-53 inclusive. Deaths, 1910-49, Vital Statistics of the United States. U. S. Bureau of the Census, 1910-44; U. S. Public Health Service 1945-49. 1950-51 data from advance releases, 1952 data from 10 percent mortality sample, Jan.-Nov., National Office of Vital Statistics.

For 1909 only 3 States submitted morbidity report- to the Public Health Service and in the following 7 years the numbers ranged from 11 to 29. After the 1916 epidemic, Lavinder, Freeman, and Frost published a summary of morbidity and mortality for the period 1909-16 which incorporated data from a number of States not included in the earlier national summaries. For the years 1909-15, they obtained additional State morbidity reports and also mortality reports for some States in which no morbidity data were available. For the latter, estimates of cases were made from reported poliomyelitis deaths, assuming a case fatality rate of 20 percent. For States in which only certain cities were in the registration area, deaths for the entire State were estimated from those in the registration areas. Since Lavinder, Freeman, and Frost had noted that in States for which registration was complete, the urban death rate was lower than the rural rate and that a case fatality as high as 20 percent occurred only rarely, they believed that error in their estimates had been in the direction of underestimation. Because of the care which went into this study, their figures for annual incidence of poliomyelitis in the Nation for 1909-16 are quoted below:

Year	Cases per 100,000 population
1909.....	6.9
1910.....	13.3
1911.....	9.5
1912.....	8.5
1913.....	6.6
1914.....	5.1
1915.....	5.1
1916.....	28.5

During the 5 years following the 1910 outbreaks, the estimated national rates declined. In these years the largest outbreaks took place in 1912, when New York reported 1,108 cases and California, 531. These were the only instances in which a State reported more than 500 cases, although Massachusetts, New York, Pennsylvania, and Virginia reported from 100 to 500 cases annually, and Illinois and Ohio reported from 100 to 500 cases in 4 of the 5 years.

The great epidemic of 1916, although leading to highest rates in the northeastern States, also

Table 1. States reporting 20 or more poliomyelitis cases per 100,000 population in 1916

Eastern States	Number of cases	Case rate	Central and western States	Number of cases	Case rate
New Jersey.....	4,055	138	Minnesota.....	909	40
New York.....	13,223	129	Michigan.....	616	20
Connecticut.....	951	76	Montana.....	94	20
Massachusetts.....	1,926	52	Wisconsin.....	475	19
Rhode Island.....	222	36			
Delaware.....	79	37			
Pennsylvania.....	2,181	26			
Maryland.....	352	26			
Maine.....	149	19			

SOURCE: Lavinder, Freeman, and Frost (1).

struck severely in the north central area and in Montana. States with rates of approximately 20 per 100,000 population or larger are listed in table 1.

For the year 1916, Lavinder, Freeman, and Frost obtained morbidity reports from all but four States, amounting to a total of 29,061 cases. From these they estimated the national rate to have been 28.5 cases per 100,000 population.

Table 2. Annual poliomyelitis case and death rates, United States,¹ 1917-31

Year	Cases per 100,000 population	Number of States reporting cases	Deaths per 100,000 population death-registration States
1917.....	4.8	37	1.4
1918.....	2.9	38	1.2
1919.....	2.2	40	.9
1920.....	2.4	42	.9
1921.....	6.1	47	1.8
1922.....	2.0	48	.8
1923.....	2.9	49	.9
1924.....	4.6	48	1.1
1925.....	5.2	48	1.5
1926.....	2.2	48	.8
1927.....	8.8	48	1.8
1928.....	4.2	49	1.2
1929.....	2.3	49	.7
1930.....	7.5	49	1.2
1931.....	12.8	48	1.8

¹ Includes District of Columbia as a separate reporting unit. States reporting cases not necessarily the same as those reporting deaths.

SOURCES: Cases, Notifiable Diseases, Annual Reports, Public Health Service; Deaths, Death-Registration States, Annual Reports, Vital Statistics of the United States.

The total number of cases in the District of Columbia and the 27 States which reported to the Public Health Service was 27,363. Among these States, the average rate was 41 cases per 100,000 population.

Years 1917-31

After 1916, no additional efforts were made to obtain complete information on reported cases of poliomyelitis. Annual case rates for the Nation, computed on the basis of the populations of those States submitting reports, and death rates for the death-registration States are shown in table 2. The period seems to have been one of generally low incidence of poliomyelitis. National rates varied from 2.0 in 1922 to 8.8 in 1927, except for the epidemic year of 1931, when the rate reached 12.8. Despite the generally low national rates, outbreaks of moderate size were reported by a number of States.

In 1917, the rate in Vermont was three times the 1916 rate. In the early and middle 1920's, the north central and western States of Minnesota, North Dakota, Montana, and Washington reported the highest rates in the country. In 1927 and 1928 a dozen States, ranging from Maine to California, reported from 21 to 49 cases per 100,000 population. The 1931 outbreak was largely concentrated in the New England and Middle Atlantic States, and in Michigan in the midwest. The highest rates occurred in Connecticut (69.6) and in New York (48.2).

Years 1932-52

Annual rates for the United States during the period 1932-52 are shown in table 3. After the 1931 outbreak, the annual national rates did not exceed 10 cases per 100,000 population until 1944. In 1943 the case rate was 9.3, the highest since 1931, and in the succeeding years rose to successively higher levels, until in 1952 both the case rate (36.9) and the estimated death rate (2.0) were higher than in any year since the 1916 epidemic. With the marked upward trend in the morbidity rate, there has been a slight but definite increase in the mortality rate. This has resulted in a progressive decline in the ratio of reported deaths to cases from 14.0 percent in the period 1932-36 to 5.8 percent in the period 1947-51.

Table 3. Poliomyelitis case rates, death rates, and their ratios, United States, 1932-52¹

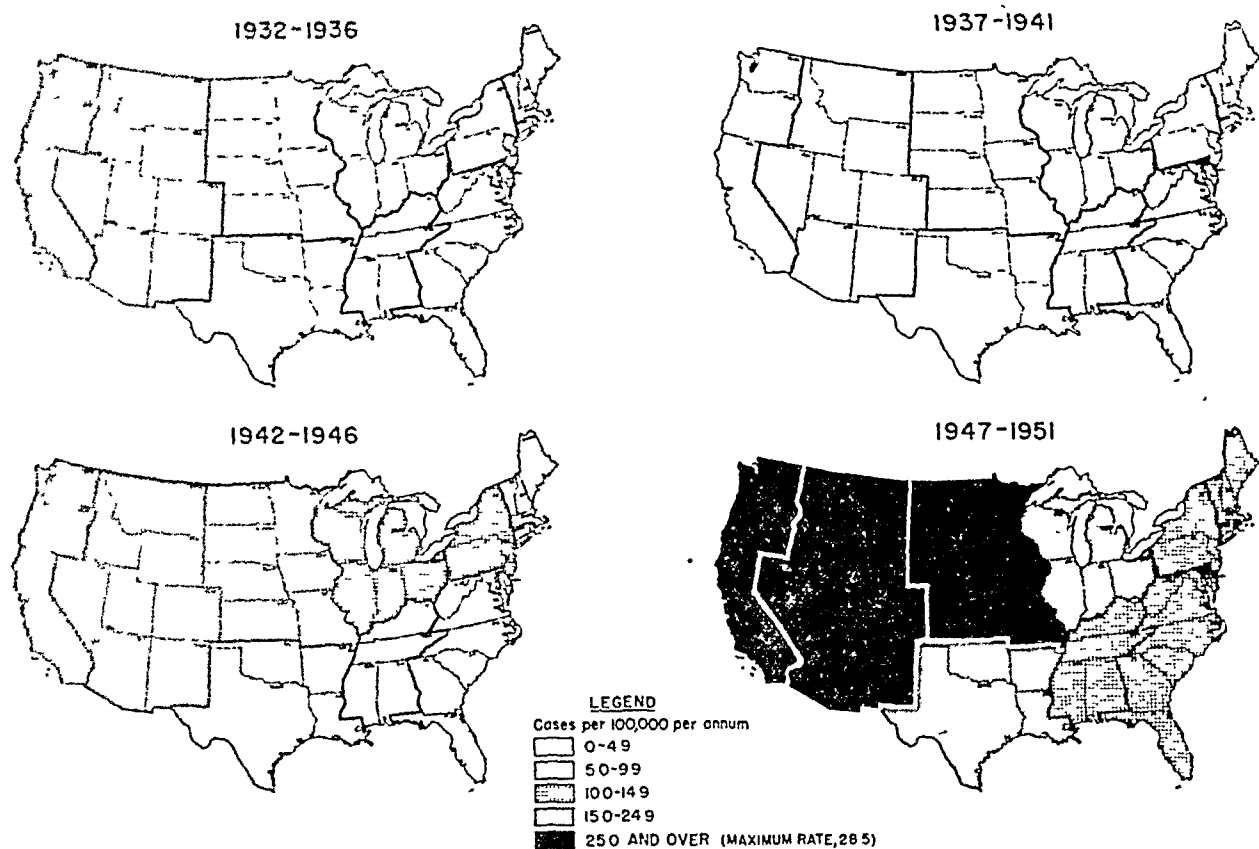
Year	Rates per 100,000 population		Ratio of death rate to case rate (percent)	Average case rate	5-year death rate	Ratio of death rate to case rate (percent)
	Cases	Deaths				
1932---	3.0	0.7	23.3			
1933---	4.0	.6	15.0			
1934---	5.9	.7	11.9			
1935---	8.5	.8	9.4			
1936---	3.5	.6	17.1	5.0	0.7	14.0
1937---	7.4	1.1	14.9			
1938---	1.3	.4	30.8			
1939---	5.6	.6	10.7			
1940---	7.4	.8	10.8			
1941---	6.8	.6	8.8	5.7	.7	12.3
1942---	3.0	.4	13.3			
1943---	9.3	.9	9.7			
1944---	14.3	1.0	7.0			
1945---	10.3	.9	8.7			
1946---	18.4	1.3	7.1	11.1	.9	8.1
1947---	7.5	.4	5.3			
1948---	19.1	1.3	6.8			
1949---	28.4	1.8	6.3			
1950---	22.0	1.3	5.9			
1951---	18.6	.9	4.8	19.1	1.1	5.8
1952---	36.9	² 2.0	5.4			

¹ Case and death rates based on population of States reporting both cases and deaths.

² 1952 death rate estimated from 10-percent national sample of the National Office of Vital Statistics, January through November 1952.

The morbidity rate for 1952 falls between the two estimates (see above) for 1916, while the estimated mortality rate for 1952 is only one-fifth as great as the 1916 death rate of 10.5 per 100,000. The question of whether or not the 1952 epidemic was more severe than that of 1916 is obscured by several factors relating to the population bases used in determining the rates. In 1952 reports of cases and deaths were available from all States, whereas for 1916 two estimates of the morbidity rate are available, but neither of the populations on which these are based is the same as that of the 26 death-registration States for which the mortality rate was 10.5 per 100,000. Also, the 1916 population of the death-registration States coincided closely with the populations severely affected by the epidemic, while the 1952 estimated death rate of 2.0 per 100,000 includes populations not in epidemic areas. In addition to these factors,

Figure 2. Poliomyelitis morbidity—average 5-year rates, major geographic divisions of the United States, 1932-36, 1937-41, 1942-46, 1947-51.



others must be considered: for example, improvement in completeness and accuracy of morbidity reporting; and improvement in treatment, presumably resulting in lowered case fatality rates.

Geographic Distribution

The geographic distribution of poliomyelitis in the United States during the last 20 years is described for the nine major geographic divisions of the country from two approaches: average incidence in successive 5-year periods and variation in annual incidence. Each method gives emphasis to different aspects of secular changes in geographic distribution of the disease.

Average Incidence

Aycock (3), in studying distribution of poliomyelitis in the United States during the period 1910-27, and later Wells (4), in a study of the period 1915-29, came to the conclusion that incidence in the northern States had been distinctly greater than that in the southern

portion of the country. Both of these studies included the 1916 epidemic, which caused the average rates to be heavily weighted by this single northern epidemic. Collins (5), examining data for the period 1930-45 noted that little poliomyelitis had been reported from the three southern divisions prior to 1935 but that subsequently they experienced "some rather large epidemics." Gilliam, Hemphill, and Gerende (6, 7), in a study of county rates during the period 1932-46, came to a similar conclusion. In their study, the average annual rate in the period 1932-46 for northern counties was 7.6 and for southern counties, 6.4. However, in large urban counties of over 500,000 population, average rates were lower in northern than in southern counties. In counties under 100,000 population, the reverse was true—the average rates were higher in northern than in southern counties. The period was one of generally low incidence, except for the later years, 1944-46. In the present study, examination of rates for the 20 years 1932-51, in successive 5-year periods, did not seem to reflect consistent geographic localization (fig. 2).

During the first 10 years (1932-41) of the period, average incidence was remarkably uniform over 5 of the 9 major geographic divisions (table 4) ranging from 5.1 to 5.9 per 100,000 population. One of these five was the East South Central division. The lowest rates occurred in the West South Central and South Atlantic States (3.0 and 4.6); the highest rates occurred in the Mountain and Pacific divisions (6.3 and 10.7).

During the first half (1942-46) of the next decade, the northwestern divisions had rates which were generally higher than those of the South Atlantic, East South Central, and West South Central divisions. However, within the eastern and southern regions, the average 5-year rates for the New England States was somewhat lower than that of the West South Central States.

In the next 5 years (1947-51), a different configuration was displayed, the divisions west of the Mississippi having rates considerably higher than those east of the Mississippi. Average 5-year rates were nearly the same, 13.4, 14.0, 14.1, and 14.5 per 100,000 respectively, in the East South Central, South Atlantic, New England, and Middle Atlantic States. In intermediate position were the East North Central and West South Central States with average rates of 20.4 and 22.2 per 100,000 population.

The West North Central, Mountain, and Pacific States, with average 5-year rates, respec-

tively, of 28.5, 28.5, and 26.1, were markedly higher than the rest of the country. For individual States, 5-year average rates are shown in table 5. It should be noted that the 5-year average rates varied considerably among the States in each division.

Over the past 20 years geographic differentials in incidence between regions of the United States have existed. In the long run, these differentials have tended to become equalized, although over rather extended time periods. Over moderate periods of time, one region may experience severe epidemics alternating with periods of very low incidence, while another region may be experiencing a succession of epidemics. As a result, even longtime averages are greatly influenced by a few severe epidemic years.

The average 20-year rates for western geographic divisions, which depart most from average rates of the remainder of the country, have been greatly influenced by the experience of recent years. The marked recent rise in the western States generally, and particularly, in the southwest, suggests that it may be of interest to watch the future trend in the southeastern States which have recently had only moderate increases in their annual rates.

Changing Epidemic Patterns

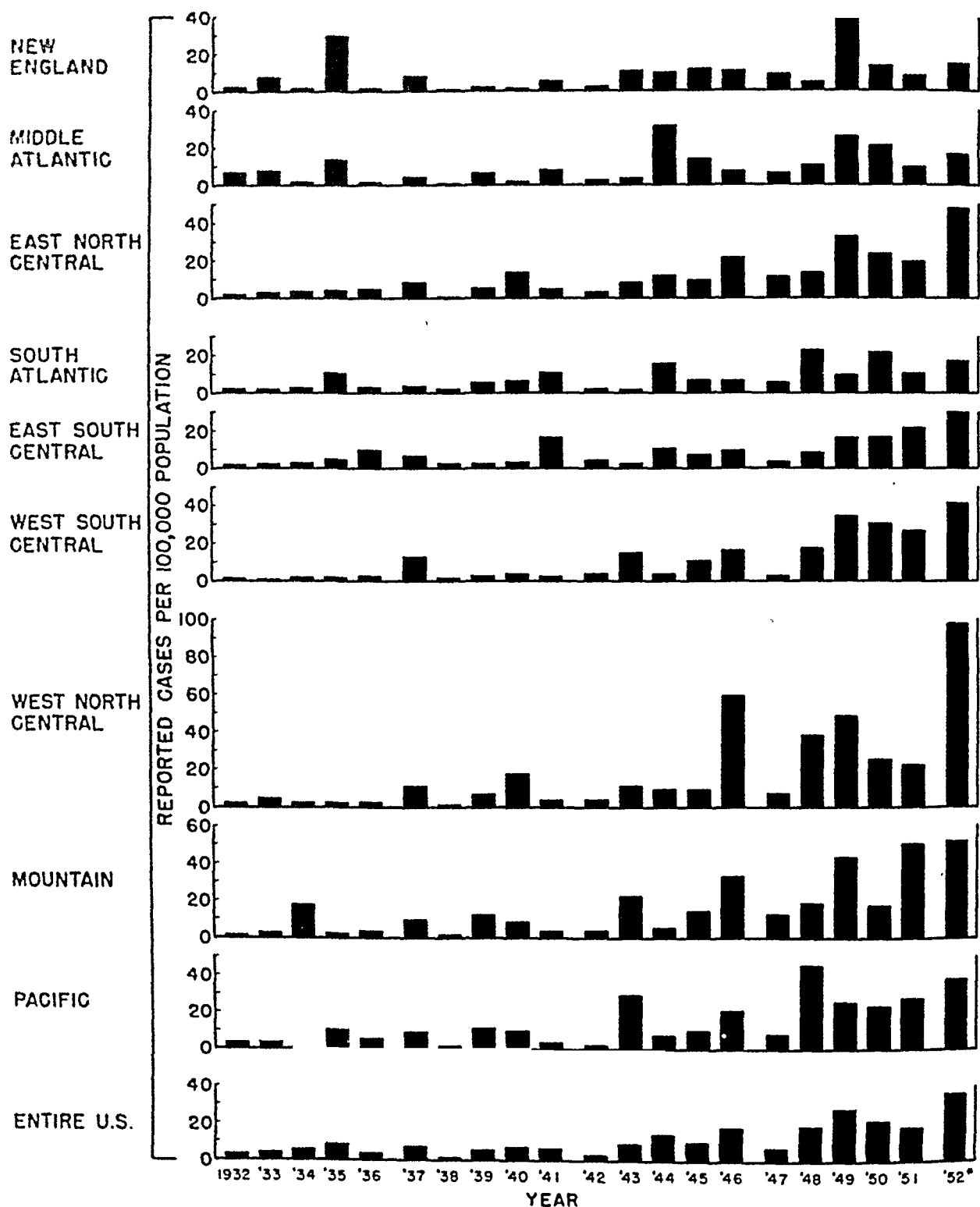
Interpretation of geographic differences calls for consideration not only of average incidence,

Table 4. Average poliomyelitis case rates in each division of the United States, 1932-51, by 5-year, 10-year and 20-year periods¹

Division	5-year mean				10-year mean		20-year mean
	1932 through 1936	1937 through 1941	1942 through 1946	1947 through 1951	1932 through 1941	1942 through 1951	1932 through 1951
New England.....	8.4	3.4	8.7	14.1	5.9	11.4	8.6
Middle Atlantic.....	6.0	4.2	11.6	14.5	5.1	13.1	9.1
East North Central.....	3.5	6.7	11.1	20.4	5.1	15.7	10.4
South Atlantic.....	3.8	5.3	6.4	14.0	4.6	10.2	7.4
East South Central.....	4.2	6.3	6.8	13.4	5.2	10.1	7.7
West South Central.....	1.5	4.6	9.9	22.2	3.0	16.0	9.5
West North Central.....	2.9	8.1	18.9	28.5	5.5	23.7	14.6
Mountain.....	5.5	7.1	16.6	28.5	6.3	22.5	14.4
Pacific.....	14.2	7.2	14.0	26.1	10.7	20.1	15.4

¹ Average numbers of cases per 100,000 population based on annual reports in *Notifiable Diseases*, Public Health Service.

Figure 3. Poliomyelitis morbidity in major geographic divisions of the United States, reported cases per 100,000 population per annum, 1932-52.



*1952 PRELIMINARY NOTIFICATIONS

but also of shifting centers of epidemic concentration. Configurations of States swept by epidemics change from year to year as the areas of greatest incidence move from one region to another. Regions swept by an epidemic at one time dissolve into components which re-form in new configurations as a succeeding epidemic wave develops.

The annual concentrations of epidemics have been illustrated excellently in the series of maps prepared for many years by Dr. Carl C. Dauer. The first maps in this series were published in *Public Health Reports* (16) and included the years 1933-37. For subsequent years the maps have been published yearly in an annual review of reported poliomyelitis in the United States. The changing centers of epidemic concentration illustrated in detail in Dauer's series of maps can also be recognized in the annual poliomyelitis rates (fig. 3 and table 6) for each division of the United States.

From 1932 through 1939, three distinctive patterns of epidemic outbreaks emerge: The Mountain and Pacific States, which experienced their most severe outbreak in 1934; the New England, Middle Atlantic, and South Atlantic States in 1935; the East South Central States in 1936 and 1937; and the remaining three central divisions in 1937.

From 1940 through 1948, severe epidemics did not strike east and west of the Mississippi in the same years, except for States in the East North Central division, which experienced epidemics coincident in some years with States east of the Mississippi; in other years, with western States. In 1944, the East North Central States reflected the eastern epidemic; and in 1946, the western outbreak.

In 1949, all divisions except the South Atlantic experienced severe outbreaks of poliomyelitis. In the latter division, 1948 and 1950 were years of greater severity. In 1950, rates were moderately high in all areas.

In 1951, the national rate was lower than in the preceding 3 years. The highest rate was recorded in the Mountain division. In the severe epidemic of 1952, a record rate of 98.0 occurred in the West North Central States. Record rates were also reported from the other three central divisions and from the Mountain

Table 5. Reported cases of poliomyelitis, per 100,000 population, by States, 1932-51¹

State	5-year averages			
	1932-36	1937-41	1942-46	1947-51
New England:				
Maine.....	8.6	5.0	4.8	14.9
New Hampshire.....	4.2	3.3	12.4	13.9
Vermont.....	9.3	6.4	13.0	15.1
Massachusetts.....	9.0	3.1	7.3	13.5
Rhode Island.....	11.3	2.4	8.2	10.6
Connecticut.....	6.5	3.3	10.7	17.1
Middle Atlantic:				
New York.....	7.7	4.7	14.6	18.5
New Jersey.....	5.9	4.0	9.5	16.5
Pennsylvania.....	4.1	3.6	5.6	8.0
East North Central:				
Ohio.....	3.4	5.5	7.4	18.8
Indiana.....	1.5	6.0	6.6	14.3
Illinois.....	4.0	5.2	15.3	19.4
Michigan.....	4.8	11.1	8.9	25.0
Wisconsin.....	2.4	6.7	14.7	25.6
West North Central:				
Minnesota.....	5.6	11.0	29.5	32.2
Iowa.....	2.2	11.4	11.1	34.4
Missouri.....	1.4	4.3	10.6	14.8
North Dakota.....	4.6	3.1	19.2	25.3
South Dakota.....	3.7	6.5	13.6	51.7
Nebraska.....	1.8	7.5	17.2	37.6
Kansas.....	3.3	9.8	23.7	26.0
South Atlantic:				
Delaware.....	2.2	3.4	12.4	21.9
Maryland.....	2.9	4.2	7.9	12.0
District of Columbia.....	5.5	5.0	10.7	13.9
Virginia.....	7.4	4.3	9.1	15.7
West Virginia.....	3.6	9.1	4.6	13.5
North Carolina.....	5.1	2.9	6.9	20.7
South Carolina.....	2.1	7.4	3.7	10.6
Georgia.....	2.2	7.1	2.9	9.7
Florida.....	.9	4.6	7.9	11.3
East South Central:				
Kentucky.....	4.7	5.5	8.6	14.0
Tennessee.....	5.2	5.5	6.1	14.4
Alabama.....	4.2	8.2	5.1	9.8
Mississippi.....	2.3	6.0	6.0	15.6
West South Central:				
Arkansas.....	1.2	5.3	7.7	21.1
Louisiana.....	2.2	3.5	6.5	12.7
Oklahoma.....	1.5	6.7	11.4	26.0
Texas.....	1.2	3.9	10.8	24.0
Mountain:				
Montana.....	13.3	6.9	10.1	12.9
Idaho.....	8.4	5.4	3.9	44.3
Wyoming.....	3.4	8.7	15.3	33.3
Colorado.....	1.5	7.8	23.9	32.8
New Mexico.....	3.3	6.9	10.8	18.0
Arizona.....	9.2	6.4	12.6	23.5
Utah.....	2.1	8.9	28.1	35.8
Nevada.....	5.1	1.9	9.4	16.5
Pacific:				
Washington.....	12.7	7.6	14.5	19.3
Oregon.....	4.5	5.3	14.2	20.9
California.....	15.9	7.4	15.5	29.5

¹ Preliminary notifications.

Table 6. Cases of reported poliomyelitis in major geographic divisions, 1932-52

Year	Cases per 100,000 population									
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	United States
1932	2.3	6.7	1.9	2.3	2.0	1.8	1.1	1.4	3.5	3.0
1933	7.1	7.5	3.0	4.9	1.8	2.0	.4	2.8	3.5	4.0
1934	1.6	1.5	3.7	2.5	2.2	2.6	1.7	17.9	48.1	5.9
1935	29.3	13.2	4.1	2.2	10.2	4.9	1.8	2.2	10.5	8.5
1936	1.5	1.3	4.9	2.7	2.8	9.7	2.3	3.2	5.6	3.5
1937	8.0	4.1	8.3	11.1	3.1	6.6	12.4	9.8	9.1	7.4
1938	.9	.9	1.0	1.3	1.8	2.3	1.4	1.6	1.6	1.3
1939	1.8	6.2	5.3	7.0	5.1	2.6	2.8	12.1	11.4	5.6
1940	1.2	1.6	13.7	17.5	6.1	3.4	3.8	8.7	9.9	7.4
1941	5.2	8.0	5.0	3.8	10.4	16.5	2.4	3.5	3.9	6.8
1942	2.1	2.4	3.5	4.0	2.0	4.1	3.7	3.8	2.3	3.0
1943	10.5	3.4	8.5	11.5	1.3	2.3	14.9	22.4	29.3	9.3
1944	9.6	31.1	12.2	9.9	15.2	10.8	3.8	5.1	7.5	14.3
1945	11.3	13.9	9.8	9.8	6.9	7.1	10.7	14.0	10.1	10.3
1946	10.1	7.1	21.5	59.5	6.7	9.5	16.2	37.7	21.0	18.4
1947	8.2	6.9	11.8	7.2	5.6	3.7	2.7	12.6	8.3	7.5
1948	4.3	10.1	13.8	38.3	22.7	8.6	17.2	18.9	45.3	19.1
1949	37.1	25.4	32.8	48.9	9.5	16.5	34.3	43.3	25.8	28.4
1950	13.0	20.7	23.8	25.4	21.8	16.7	30.2	17.2	23.4	22.0
1951	7.9	9.5	19.6	22.8	10.4	21.5	26.7	50.4	27.5	18.6
1952	14.2	16.1	47.7	98.0	17.0	30.0	41.3	51.8	38.1	36.9

SOURCE: Notifiable Diseases 1932-50 and Annual Summary in *Public Health Reports*, May 25, 1951, pp. 677-683. National Office of Vital Statistics: Weekly Morbidity Reports, 1952.

States. The Pacific division experienced the third highest rate in its history. Along the eastern seaboard rates were well below the national average, although moderately high in comparison with many previous years.

Seasonal Distribution

If the reported cases of poliomyelitis in the United States for each month are averaged for a few years, the resulting curve rises slightly in

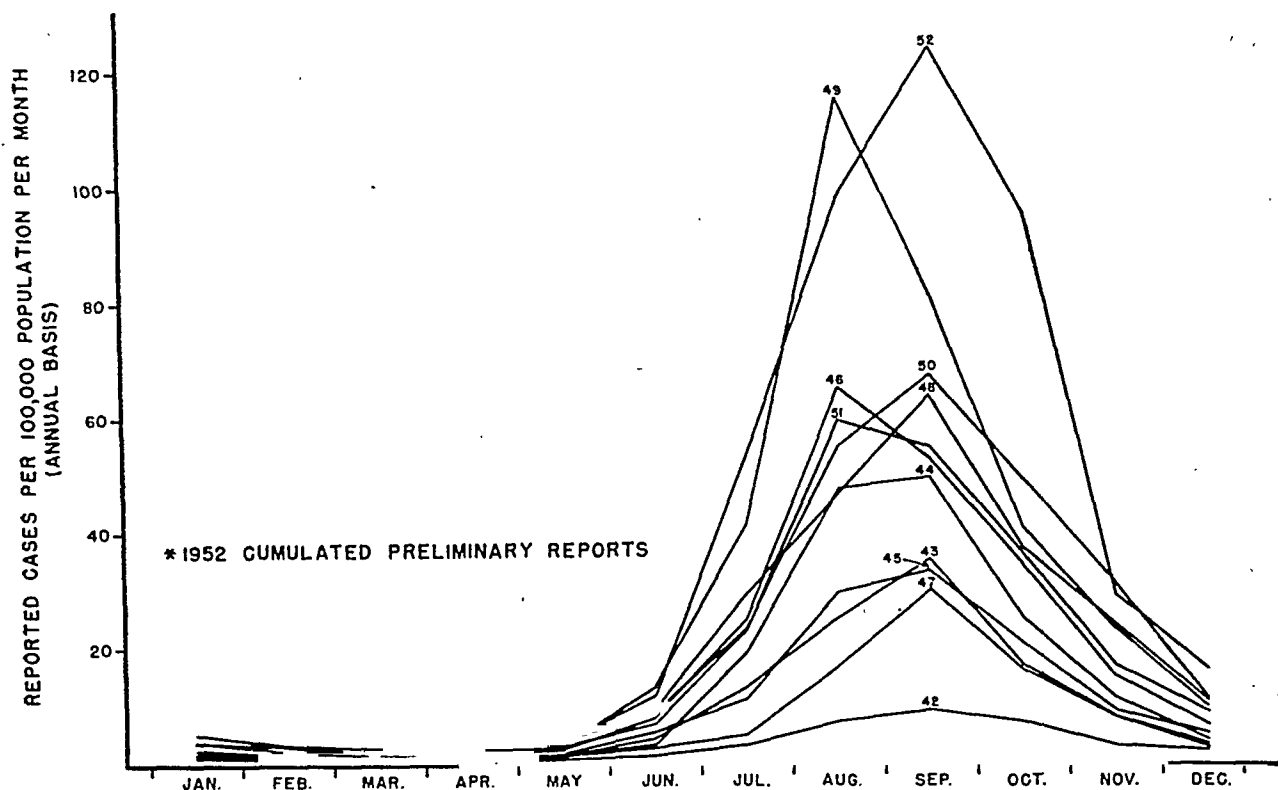
Table 7. Seasonal incidence of poliomyelitis, United States, 1942-52

[Reported cases per 100,000 population, each month, adjusted to annual base]

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual Rate
1942	1.0	0.9	0.7	0.5	0.7	1.1	3.4	6.9	8.7	6.8	3.3	2.2	3.0
1943	1.3	.9	.9	.7	1.2	4.2	13.0	25.5	34.6	17.2	8.0	3.2	9.3
1944	1.0	.9	.7	.8	1.2	3.8	19.6	47.8	49.5	25.5	10.8	4.0	14.3
1945	1.5	1.5	1.1	1.1	1.6	4.7	11.2	29.3	33.9	21.2	9.8	4.6	10.3
1946	1.7	1.3	1.3	1.2	2.4	8.0	25.5	65.2	52.8	34.1	14.9	6.2	18.4
1947	2.4	1.6	1.2	1.0	1.3	2.2	5.6	16.1	30.4	16.3	8.0	3.3	7.5
1948	1.4	1.0	1.0	1.1	4.4	9.2	29.5	46.6	62.9	36.6	24.1	11.5	19.1
1949	3.9	2.2	2.0	1.6	3.3	12.6	41.8	115.0	81.3	41.1	23.7	9.9	28.4
1950	3.7	3.4	2.9	2.1	4.0	9.1	24.0	54.9	66.6	49.7	31.1	11.4	22.0
1951	5.3	3.2	1.8	2.0	3.0	7.0	22.8	59.5	54.9	36.4	16.7	8.5	18.6
1952 ¹	5.0	3.0	2.1	2.8	3.7	11.9	53.0	96.0	121.7	94.0	29.5	16.9	36.9

¹ Preliminary notifications.

Figure 4. Poliomyelitis morbidity, seasonal incidence, United States, rates by month, each year, 1942-52.



May, more rapidly in June and July, and reaches a maximum elevation in August and September. In October there is a marked decline which continues through succeeding months. In some years (fig. 4, table 7), August is the month of maximum incidence; in others, September; but in some, the attack rate has been

approximately the same in both months, for example, the years 1944 and 1951. In two recent years, 1950 and 1952, the October rate has been relatively higher than in earlier years.

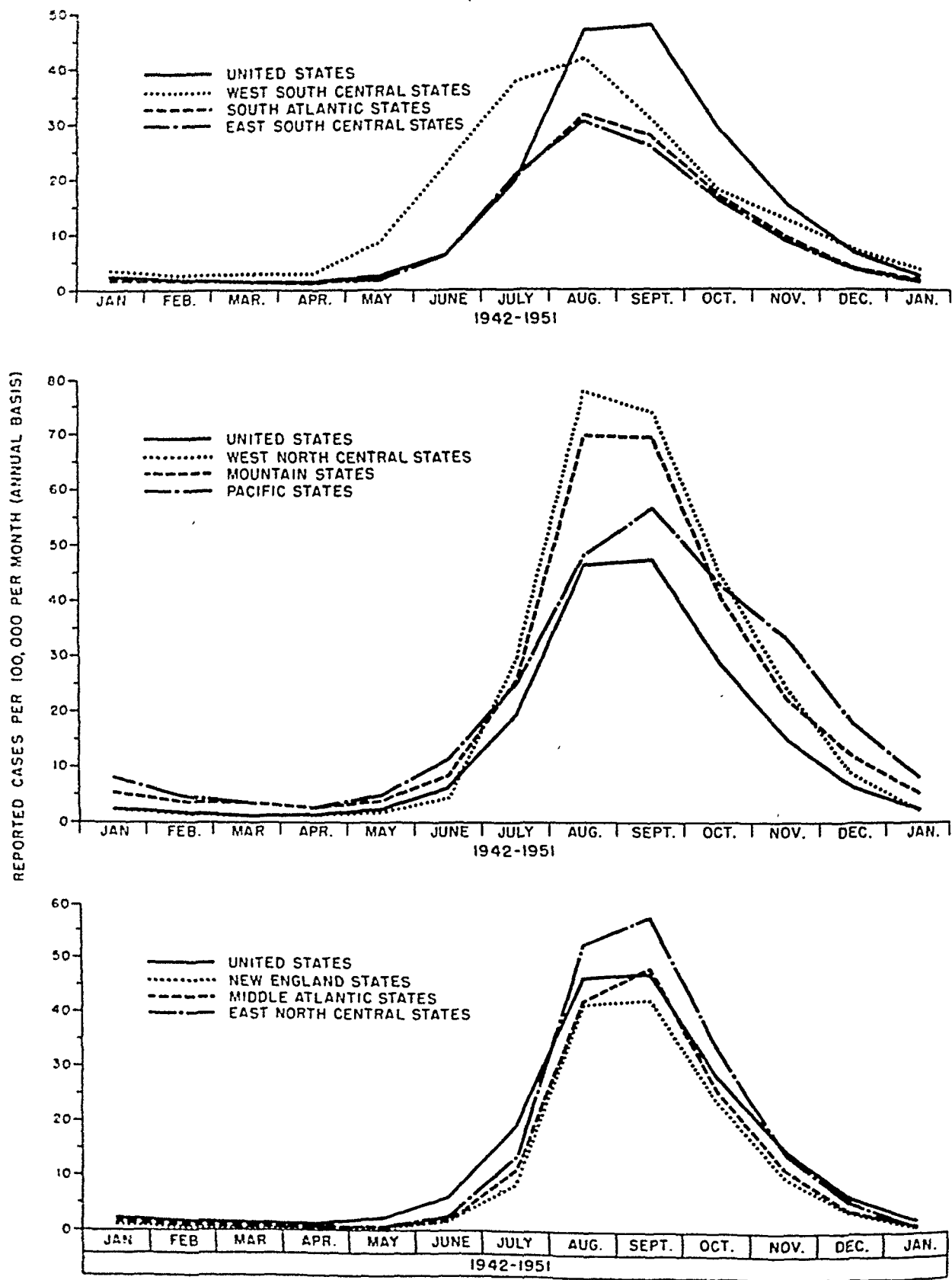
The seasonal change in incidence differs from one region of the United States to another (fig. 5, table 8) and these differences are re-

Table 8. Seasonal incidence of poliomyelitis in major geographic divisions, 10-year average, 1942-51

[Reported cases per month, per 100,000 population adjusted to annual base]

Divisions	January	February	March	April	May	June	July	August	September	October	November	December
New England.....	1.1	0.5	0.5	0.4	0.5	1.7	8.7	41.6	42.7	24.2	10.1	3.8
Middle Atlantic.....	1.4	.9	.7	.7	.7	1.9	11.2	42.2	48.2	26.6	11.6	4.0
East North Central.....	1.1	.8	.6	.5	.7	2.3	13.9	52.8	57.7	33.8	14.6	5.5
South Atlantic.....	1.8	1.8	1.2	1.1	2.4	6.2	20.0	31.1	27.5	16.6	9.2	3.7
East South Central.....	1.5	1.8	1.3	1.3	1.6	6.2	20.7	30.0	25.7	15.8	8.6	3.8
West South Central.....	3.5	2.5	2.9	2.8	8.4	22.6	37.2	41.1	30.4	17.8	12.3	7.0
West North Central.....	2.1	1.5	1.0	1.1	1.6	4.4	29.5	77.9	73.9	44.6	24.1	8.7
Mountain.....	5.1	3.6	3.3	2.4	3.9	8.3	25.6	69.7	69.3	40.5	22.2	12.0
Pacific.....	8.0	4.7	3.4	2.7	4.9	11.2	25.4	48.0	56.5	42.8	33.1	17.9
United States.....	2.3	1.7	1.3	1.2	2.3	6.2	19.6	46.6	47.3	28.4	15.1	6.5

Figure 5. Poliomyelitis morbidity, seasonal incidence, 10-year average rates by major geographic divisions, 1942-51.



flected in the national curve of seasonal incidence as the center of epidemic intensity year-to-year moves from one area to another.

In the southern divisions of the United States, the initial rise occurs in May, reaching a maximum level in August; in the central and Pacific States, the rise begins in June and the high levels occur in August and September; and in the northeastern divisions the rise is not appreciable until July, and the highest average rates are observed in September. Generally, the epidemic span is shorter, with rise and fall more rapid, in northern latitudes.

Seasonal concentration of cases during a short epidemic period has been characteristic of the New England, Middle Atlantic, and East North Central States. In these divisions (table 9), 60 percent of the year's cases, on the average, have been reported during August and September. In the West North Central and Mountain divisions, concentration in these months has been similar but somewhat less pronounced. In these divisions, 50 to 55 percent of the total annual number of cases were reported during August and September in 1942-51.

In the South Atlantic, East South Central, and West South Central divisions, concentration in August and September has been less noticeable. Approximately 60 percent of the year's cases, on the average, were reported during July, August, and September. In the

Pacific States, extension of the season of higher incidence into the fall months has been noticeable; 40 percent of the annual total cases, on the average, having been reported during August and September, and another 30 percent of the annual totals, during October and November.

Summary

Early descriptive accounts of poliomyelitis outbreaks in the United States have been reviewed and an analysis made of State morbidity reports since 1907.

Poliomyelitis, a comparatively rare disease in the early years of this century, has since been recognized as a communicable disease problem in every State in the Nation. During the last 20 years the trend of the annual case rate has been upward, particularly during the last decade, during which a marked increase has occurred. The death rate has shown a slight but definite increase. In 1952, for the Nation, both the case rate and the estimated death rate were the highest since the 1916 epidemic. The ratio of reported deaths to reported cases has decreased over the last 20 years.

Earlier observers noticed that rates had been higher in the northern than in the southern regions of the country. In recent years this difference has diminished and an East-West differential is more prominent. In recent years both average and maximum rates have been

Table 9. Seasonal incidence of poliomyelitis in major geographic divisions; number of cases per month expressed as percentage of total cases, 10-year average, 1942-51

Divisions	January	February	March	April	May	June	July	August	September	October	November	December	Total
New England.....	0.8	0.3	0.4	0.3	0.4	1.2	6.5	31.0	30.9	18.1	7.3	2.8	100.0
Middle Atlantic....	.9	.6	.4	.4	.5	1.2	7.6	28.5	31.6	18.0	7.6	2.7	100.0
East North Central.....	.6	.4	.3	.3	.4	1.2	7.6	29.1	30.7	18.6	7.8	3.0	100.0
South Atlantic.....	1.4	1.4	1.0	.9	2.0	5.0	16.5	25.7	21.9	13.7	7.3	3.1	99.9
East South Central.....	1.3	1.4	1.1	1.1	1.4	5.1	17.7	25.7	21.3	13.5	7.1	3.3	100.0
West South Central.....	1.9	1.2	1.5	1.5	4.5	11.8	20.0	22.1	15.8	9.5	6.4	3.8	100.0
West North Central.....	.8	.5	.4	.4	.6	1.6	11.1	29.2	26.8	16.7	8.7	3.2	100.0
Mountain.....	1.9	1.2	1.3	.9	1.5	3.1	9.8	26.6	25.6	15.4	8.2	4.6	100.1
Pacific.....	3.1	1.7	1.3	1.0	1.9	4.3	10.0	18.8	21.5	16.8	12.6	7.0	100.0
United States.....	1.3	.9	.8	.7	1.3	3.4	11.1	26.4	26.0	16.1	8.3	3.7	100.0

higher in the western and north central division of the United States than in the northern and southeastern divisions. Over extended periods of time geographic concentration has not been consistent.

In southern regions of the country, seasonal rise in incidence occurs earlier and the epidemic span is longer than in the northern regions.

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Type I Poliomyelitis Virus Adapted to Mice

Successful adaptation of type I (Mahoney) poliomyelitis virus to Swiss mice has been achieved by Drs. C. P. Li and Morris Schaeffer of the Public Health Service Communicable Disease Center. Their report appears in the March 1953 issue of the Proceedings of the Society of Experimental Biology and Medicine, pages 477-481.

The authors conclude that: "The use of the intraspinal route of inoculation and the selection of a mutant or variant of the virus is believed to be responsible for this adaptation. . . . With this attainment, all three poliomyelitis virus types have now been adapted to mice. This will permit for rapid progress in field and laboratory studies of poliomyelitis." The findings are important to poliomyelitis diagnosis and to the development of a live virus vaccine.

Public Health Operating Statistics

By ROBERT G. WEBSTER, M.P.H.

"GOLD THAT BUYS health can never be ill spent." Thus, in 1603, John Webster, Elizabethan poet and dramatist, gave expression to an opinion which later centuries have proved correct. The dividends of investments in health were never greater than they are today.

But today we must be prepared for a tightening of the purse strings. The cost of war or its prevention, estimated at over 75 percent of the total Federal budget (1), may have seriously threatened the future of the grants-in-aid fiscal program supported by the Congress. The nearness of the saturation point in the potential for tax collections in State and local governments indicates the need for better justification of public health programs, if increased support is to be expected from this source.

The generosity of the American people has made it possible for many voluntary organizations to make significant contributions to public health. Increasing efforts are required to collect such funds, and the number of voluntary groups competing for the beneficence of the public multiplies the problem of financing public health. If appropriating bodies are asked to provide adequate funds, public health agencies must provide standards for evaluation against which the funds requested may be measured. We should, therefore, thoughtfully consider the use of statistics to measure the costs of public health.

Robert G. Webster, M.P.H., is chief of the division of administration of the California State Department of Public Health. This paper was presented at the 2d Conference on Public Health Statistics at the University of Michigan on June 17, 1952.

Financial Evaluation

Historically, the total gross cost of a unit of government was simply the total of the budgetary column. While this figure has some use as a general indication of the division of expenditures among the large areas of government service, more detail is needed to study the specific costs of a public health program. The recognition of a problem and the desire to do something about it are seldom sufficient in themselves to justify the grant of funds from the public treasury.

The use of statistics in building a vivid accounting picture of the operations of an agency well justifies the existence of a statistical service. Such an application of statistics gives real body to the substantiation and need for the statistical unit and presents opportunity for a realistic use of quantitative measurements in a situation where realism might be overlooked.

Service Records

"Service statistics in public health are numerical measurements of services rendered to individuals and to the community through public health programs" (2). Service statistics are a measurement of activity in terms of number of units rather than in terms of dollars.

Service, operating, or performance statistics have real value in the analysis of public health programs. They serve as guides for the administration, for the measurement, and for the evaluation of activities, and for planning. It should not be overlooked, however, that service statistics, to serve their full purpose, should be related as far as practical to specific public health problems—the problems of population, water

supply, sanitation, morbidity, mortality, and other factors.

Screening surveys, one of the newer activities in the public health field, furnish practical records in the fields of tuberculosis, venereal disease, and chronic disease. Operating records of these surveys often indicate the number of suspects found, suspects referred for medical followup, referrals completed, and the active or positive diagnoses resulting from the screening program. Statistics as to the number of persons screened are, of course, basic.

Records of persons immunized for diphtheria, pertussis, tetanus, smallpox, typhus, typhoid, or other diseases are another measure of the progressiveness and the activity of a public health agency. Such statistics usually are maintained by age groups. Often a separate tabulation is made of booster shots given.

The service records in communicable disease may be generally classified as records in the area of case finding and records related to control and service. The number of individuals X-rayed or the number of X-ray films used is an example of the case-finding statistic.

In the tuberculosis field, a tabulation of the number of tuberculosis contacts investigated becomes an evaluation of the case-finding activities. The number of laboratory tests made are of interest, too.

For control of service activities, it is helpful to compile a record of the clinic hours during which the clinic operates. This serves not only as an evaluation of the use of time, but it also indicates the availability of the service. The number of visits made to a clinic is the most frequently compiled operating statistic. More important, and more difficult, is the count of individuals admitted to a clinic which gives an opportunity for the evaluation of clinic coverage, rather than of only the clinic traffic.

Applicable to most public health programs is the tabulation of field visits or home visits. It cannot be overlooked in any cost study since in many activities a large proportion of the time is spent in home calls.

Operating records may be compiled in health education, although they are not always significant. The number of public health films shown and the number of people viewing them are tabulations which may be obtained with a min-

imum of effort. Knowing the number of different training courses offered and the number of people exposed to such courses leads to an evaluation of a direct training enterprise. The number of pieces of printed material which are distributed is in itself not too meaningful, but a record of how many people read such literature, and of whether they are stimulated to seek health services, could be.

The obvious service statistics in the laboratory field are the number of various tests which are made. Upon refinement, such records will indicate test results in statistical form. An index to the efficiency of collection procedures and techniques is the number of specimens examined and whether they were received in a satisfactory condition.

A wealth of operating records has been accumulated in the area of sanitation. Here the basic index is the number of field visits made, usually tabulated by type of visit. Often the number of abatements accomplished is of value. Some environmental sanitation units maintain extensive statistical compilations. These are often justified because of the wide coverage of the assignments and responsibilities in sanitation.

The evaluation schedule (3) of the American Public Health Association is a notable contribution to service statistics. Although the schedule is geared primarily to measure problems and to provide an evaluation of services available in a health department, it has led many public health agencies to become conscious of the need for, and value of, regular statistical records of activities. An outgrowth of the evaluation schedule are health practice indexes which have caused many local communities to realize their inadequacies or perhaps their proficiency. There are doubtless other operating records meeting a specific need in public health. It should be pointed out that while tabulations of cases and deaths are basic to public health, they are essentially records of occurrence rather than records of activity.

Problems of Compilation

"What is a home visit?" is a seemingly simple question, but to define it so as to assure standardization is difficult.

How does one record a partly completed procedure? Or what happens when the usual effort and time were expended in an activity, but there were no results? What happens when there were multiple accomplishments on one call? The accurate defining of geographic limits in the compilation of field service must be clear and concise: They must be understood if the statistics of operations are to reflect activities accurately.

Standardization

Ideally, the recording form should be one on which data may be quickly and easily recorded by a check mark without written explanation. Coupled with this ideal factor, however, is the seemingly contradictory need for adequate spacing and for clarity.

Attempts have been made to create standard forms of operating records. While experience is valuable in the preparation of forms, and while some day, perhaps, standard forms will be developed for definite purposes, it is probably naive to expect that the compilation of operating records can be standardized because of the variations in problems and in administration. Noteworthy, however, is the success which some States are now experiencing in statewide tabulations of selected data.

The publication in 1935 of "Recording of Local Health Work" (4) pointed the way to better forms in public health. Although the forms suggested therein did not always meet a specific need, the publication of the recommendations, which were developed through the cooperation of the Committee on Administrative Practice of the American Public Health Association, did emphasize the value of a consistent system of forms. It pointed up the value to be realized from careful planning and study of forms as an initial step in any record or statistics project.

Too Much Detail

Perhaps the greatest potential problem in the compilation of operating records is the temptation to gather too much detail and thus create a burdensome procedure. Operating records must be kept to the minimum of necessary data, or a Gargantuan procedure may result. The temptation to gather data affects nearly all.

It is so easy to speculate on what would be "nice to have," and let the items build up in the tabulations. Consideration of what practical use will be made of data should be foremost in the planning of operating statistics tabulations. The research worker may gather survey data on a sampling basis, or he may gather complete data during a limited period of time. Data which are only for information or for special purposes, or which have no application to administration or to the measurement or solution of a problem, should not be allowed to creep into permanent tabulations.

Then, too, the careful administrator will make certain that a statistical report does not become an end in itself. It is always possible for work to be done just for the benefit of the reports. To be justified, statistical data must be used.

Financial Records

Aid to the administrator in management of his organization is the primary objective of compiling cost data. Their most important use, administratively, is for period-to-period comparisons of performance costs for a particular activity. When costs increase significantly over those of an earlier period, investigation is suggested. If the increase in cost is justified and no action need be taken, it is often found that the increase may be caused by some factor which can be eliminated or corrected. Cost figures, therefore, are an indication of significant changes in program.

An administrator possessing valid financial information may choose which of two worthy programs will produce the most benefit when only a limited sum of money is available. Relative costs of each of several programs, particularly when units of service may be priced, are useful in evaluating the work. Detailed program costs are of value in seeking special grants, for such requests must be predicated upon a preconceived project in which the anticipated cost must be stipulated.

Aid to more accurate budgeting is a second objective of a cost system. At best, it is difficult to estimate in advance the financial requirements of an organization. In governmental budgeting it is often necessary to estimate expenditures as far ahead as 2 years. When costs

be known and the quantity of work can be tabulated, a unit cost may be applied to these estimates as a basis for arriving at the appropriations to be requested. There are limitations in the use of unit costs in budgeting, and such use may be found to represent a two-edged sword. Many activities in public health are intangible and cannot be easily measured by traditional workload statistics. Easily understood by budget officials are the elementary statistics of man-hours, units of performance, or, more specifically in city or State administration, the number of licenses issued, the number of miles of highway constructed, the number of beds maintained, or other measurable activities. But in public health administration, we must prepare budget substantiations with an intelligent use of statistics so as to reflect accomplishments and progress, or at least measure the extent of a problem.

A third objective of a cost project is to inform the public of the cost of public health. Such figures are often useful in answering questions or criticism. We are constantly faced with a need for emphasizing the economies of prevention when the costs of prevention are compared with the costs of treatment.

Two general patterns are followed in the handling of governmental financial records. In one, which is commonly termed the line item budget, specific and separate appropriation is made for each individual job or group of jobs by organization units. Operating expenses and capital outlay for such units are also separately itemized, that is, a separate appropriation is made in each program for postage, telephone, printing, travel, and for all the various classes of operating expenses. A tabulation of expenditures against a line item budget produces a cost system of direct costs. If a unit were entirely self-contained, including all administrative expenses, the process of determining the cost of the program would be greatly simplified. Such, however, is rarely true.

The other general plan of budgeting is through means of a blanket appropriation for the total operation. It may be implemented by a cost accounting system wherein each item of salary and expenditure is charged to certain programs or functions. The appropriations are justified by estimates based on previous

experience and costs. In this pattern, costs are developed on a cumulative basis month-by-month.

However, the fiscal systems of most governmental agencies are a combination of these two general patterns, in varying degrees. One complication is that many of the personnel in public health agencies are engaged in generalized programs, rather than in specialized services. Nurses, for example, are involved in many or in the entire gamut of public health activities.

Other Record Needs

A new need for cost figures in public health operation has arisen for insuring the validity of categorical grant expenditures. The Public Health Service and the Children's Bureau have found it desirable to request much more detail from States in justification of congressional appropriations. The problem arises because through generalized services, the same personnel will work in the fields represented by more than one Federal grant.

For example, it is proposed in some situations to assign a unit cost to a nursing visit, based on a time and a cost study. Others will assign a unit cost to units of service, such as an immunization, or a clinic visit. In the laboratory field, validity can be verified by using the number of examinations of various kinds multiplied by the unit cost per specimen. Such unit cost can be determined either by an analysis in the laboratory or by accepting other cost data.

The need for justification of expenditures further underlines the desirability of greater attention to costs in public health agencies generally.

Unit Costs

In determining the costs of an activity in a generalized operation, the allocation of personnel time or salaries looms as the most important single factor. The problem is essentially one of the division of an individual's time on a basis of hours spent on the particular programs, and segments of programs, which he serves.

First Opinions, Then Observations

. . . Now Measurement and Analysis

—from remarks by Dr. Haven Emerson
at the summary session of the Second
Conference on Public Health Statistics

In the beginning there were ideas and opinions, then observations, and these led to measurements, and this required numbers which led the mind of man from fingers to stellar spaces and predictions of eclipses. Facts and records, once accepted, tempted minds into their logical deductions, so arithmetic and logic grew together and have been inseparable.

Whether for war or slave labor, man was counted in early times, and distances were measured on land and sea and in the heavens. Our common interest has been in the human family and its social aggregates, their origin, growth, and decay, and the causes of these. Our first early concern was with reproduction of our kind and their survival, and only in today's times is there concern with their endurance, with quality and content of life.

As the first job of the physician was with the sick, the first concern of the health officer was with loss of life and with known preventable causes. He was a lone soul crying in a wilderness of disease. He sought to prevent, and thereby assumed society's heaviest burden. He aimed at the demos, the socius, rather than

at homo, the man. He was government's early agent of the biological sciences, the community guardian against the errors of inheritance, environment, and acquired habits of work, shelter, food, play, and reproduction.

Today he is a symbol of that composite branch of local government, the health department. He is not a person, but the personification of a group of specialist professions and technologies—physician, engineer, nurse, laboratory director, epidemiologist, statistician, educator, dentist, and veterinarian.

Permit me to recall the fact that health departments have been created to avert preventable diseases, to protect the community against factors of environment affecting health, to teach the laws of human biology so that longer, deeper, broader lives can be assured and not merely survival of the babe. Care of the sick is best done by a physician sought by the person in need of prevention, diagnosis, and treatment. The health department is a multiprofessional team, and in that team the statistician is an incorruptible bulwark against bungling in life-saving and life-giving services.

Public health personnel are highly trained professionally. They are attuned to educational and research work, but often they are unfamiliar with the record requirements of a production operation. While it is relatively simple in a manufacturing plant to determine with a stopwatch the time taken on an assembly line for each of many detailed operations,

the stopwatch application is seldom appropriate to public health time studies.

Simple time studies may often be made in laboratory or in vital statistics procedures. In laboratories, a specific time usually may be established for each operation, and the beginning and ending points of such a function are rather clearly defined. They are less clear in

the routine recording of vital statistics data where the staff member must do a certain amount of interpreting, as the recording function is only partly mechanical. Beyond this, most public health operations are not routine but require deliberation, and thus an arbitrary evaluation in terms of time is difficult.

Nevertheless, reasonably satisfactory data may be accumulated in determining the standard or average time which an activity takes. A broad base is one safeguard to assure the validity of such data. Surveys to determine the average time required in a particular type of field visit should cover a long enough period so that seasonal effects will be truly reflected, and so that the extremes will be considered.

In determining personnel costs, other factors besides direct time must be considered: the cost of vacation salaries, of overtime, of retirement, and of office time occupied in conferences, in meetings, and in report writing. A special problem in time allocation is the handling of the travel time which an individual spends in transportation as distinguished from the cost of transportation.

To conduct a continuous record of time accounting becomes burdensome and not very fruitful. Surveys, special studies, or sampling techniques are an answer to the problem of record keeping.

Operating expenses form the next general component of the financial costs of a program. Here we find the actual costs of travel and transportation, as well as costs of supplies, laundry, stationery, forms, postage, and the many other necessary continuing expenses. General overhead includes such items as office rent, utilities, telephone, furniture, professional expenses, and other related items. These costs must all be considered on an appropriate pro rata in the total program cost.

The National Organization for Public Health Nursing carried on studies of the detailed costs in public health nursing since 1922 and provided methods of cost accounting whereby a nursing service may easily determine its costs. Part of its pioneering work was the development of a time study work sheet which accounts for a nurse's time in three categories: first, the "component," which is travel, preparation, or the activity itself; second, the "cost

center," or the type of activity which was conducted—a visit, a clinic, a school, group teaching, and related functions; and third, the "service," which is the program in which the nurse is engaged, such as infant health, tuberculosis, acute communicable disease, or others. The time of the nurse is divided; each unit of time shows all three elements.

For a time study to be valid, all time of personnel must be accounted for, so that the total allocated cost will add up to the total expenditures. This often requires the recording of unproductive time, and sometimes the accounting itself serves to encourage full production. Again, it is worth emphasizing that the problems of time recording in public health are much more complex than they are in simple production activities. For example, in an automobile repair shop a mechanic will stamp the time he begins the job and the time he ends the job on each job ticket, and the customer pays for all time between such recordings. While this is the theory applied to time studies in public health, it is much more difficult to put into practice.

A good reason for determining unit costs in some situations is to provide an appropriate basis for charging or billing the recipient of the service, as illustrated in the management of a hospital, or in a visiting nurse function. This element is usually lacking in public health activities.

Detailed costs, however, are not always necessary for good administration. Costs should be determined only when they are needed. A tabulation of the number of units of performance is often the only computation justifiable as an aid to administration. Care must be taken that the cost and statistical procedures do not build up so that they occupy more time than is necessary. Cost figures are of diluted value unless they are promptly recorded and are available. Timeliness of such data is exceedingly important if they are to be properly used.

Great care must be exercised in attempting to compare costs between several agencies. Because so many variables exist, comparisons must be thoroughly explored. Travel time in urban areas differs from rural areas. Differences in salary rates, in the purchasing value of the

dollar, and in the services available and the plans of operation make large variations in program costs. The same methods must be followed between various agencies if comparisons are to be made. Comparisons of costs are often deceptive if they are lifted out of context and compared without careful analysis.

Summary

Operating statistics may be a valuable aid to determining program costs. While the gross cost of a program may be estimated from some budgetary statements, in a generalized public health operation statistics are necessary to properly segregate such costs by program.

Statistics as to service or performance units are a basic element in public health administration, having much value for administrative, budgetary, and educational purposes. In many situations, it is unnecessary to perform the additional computations to determine the financial costs.

The time which each individual service activity requires can best be determined by surveys, studies, or sampling. Continuous routine reporting of detailed time breakdown should be avoided.

There are many hazards in the statistical procedures leading to the computation of program costs, but the principal one is the temptation to allow the reporting and recording procedures themselves to become arduous and unduly complicated.

The detail of cost data to be accumulated should be dictated by the needs for it. Excess tabulation of cost data should be avoided, since for many purposes the statistical data alone may be used profitably, without the dollar figures.

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Statistics and Statistical Methods in Public Health Practice

With this issue, *Public Health Reports* completes publication of 16 papers presented in June 1952 before the Second Conference on Public Health Statistics at the School of Public Health, University of Michigan. These papers, with a number of others, are to be assembled in a one-volume proceedings and will be available from the school at Ann Arbor. Listed below are the papers in the order in which they were published:

Vistas in public health statistics—by Clarence J. Velz, August 1952, pp. 725-728

Application of statistical analysis in a health program—by Ruth R. Puffer, August 1952, pp. 729-736

Current methods of collecting statistics of health and health problems—by O. K. Sagen, August 1952, pp. 737-740

Statistics in the administration of a State health department—by John D. Porterfield, August 1952, pp. 741-746

The administrative value of statistics to a local health officer—by Berwyn F. Mattison, August 1952, pp. 747-754

Needed improvements in mortality data—by Iwao M. Moriyama, September 1952, pp. 851-856

The survey approach to morbidity and health data—by Halbert L. Dunn, October 1952, pp. 998-1002

Sampling and field procedures of the Pittsburgh morbidity survey—by Daniel G. Horvitz, October 1952, pp. 1003-1012

The sampling of records—by Robert E. Patton, October 1952, pp. 1013-1019

Entomological survey methods—by Robert E. Serfling, October 1952, pp. 1020-1025

A sample survey of home injuries—by F. M. Hemphill, October 1952, pp. 1026-1034

Usefulness of communicable disease reports—by Ida L. Sherman and Alexander D. Langmuir, December 1953, pp. 1249-1257

Birth statistics in maternal and child health programs—by William Haenszel, January 1953, pp. 71-80

Statistics in a health department medical care plan—by Matthew Taback and Huntington Williams, February 1953, pp. 157-166

Public health operating statistics—by Robert G. Webster, May 1953, pp. 467-473

First, opinions, then observations . . . Now measurement and analysis—from remarks by Dr. Haven Emerson at the summary session of the Second Conference on Public Health Statistics, May 1953, p. 471

Fog and Deaths in London, December 1952

By JOHN A. SCOTT, M.D., D.P.H.

DURING the first half of December 1952, the London area experienced periods of fog, one of which was of an intensity rarely reached in recent times. This fog was widespread and persisted for a considerable continuous period, from December 5 through December 8.

Its onset was determined by the meteorological factors of almost complete absence of wind or air movement and low temperature, which produced what is technically described as an "inversion" whereby the normal upward air circulation by convection currents was arrested. Hence at ground level and for many feet above, there was no air movement, and smoke, sulfur oxides, and other air contaminants increased to concentrations much above those normal for the winter season.

Atmospheric Pollution and Temperatures

In addition to the many monthly assessments of atmospheric pollution made at several observation stations, which, of course, yield only monthly averages and hence do not show the daily variations, the chemical branch of the London County Council public health department maintains daily observations of smoke and sulfur dioxide at three places: London County Hall; Northern Outfall Works,

Beckton; and Southern Outfall Works, Crossness. The figures for the determinations at London County Hall for the period November 16 through December 27, 1952, are shown in table 1.

As a basis of comparison, it should be stated that the summer (June) daily average concentration of smoke is about 0.12 milligram per cubic meter of air; of sulfur dioxide, about 0.07 part per million. It will be seen from the table that the degree of atmospheric pollution in winter is considerably greater, as would be expected. The figures for November 1952 are generally of the order usual at that time of year, but a sharp rise in pollution occurred on December 5. Maximum averages were reached over the weekend, ending at 10 a. m., Monday, December 8; the average concentration of smoke was 4.46 milligrams per cubic meter of air, and of sulfur dioxide, 1,339 parts per million. These are exceptionally high figures, indeed the highest which have been traced in our records, those for sulfur dioxide dating back to 1932. For the 6-day period from December 5 through 10 the atmospheric condition was continuously bad, as will be seen from table 1.

The mean daily temperatures recorded at Kew Observatory for the same period, together with the departures from the average experience of the past 80 years, are shown in table 2. On December 5 there was a striking fall in the temperature, and low temperatures continued until the fog lifted.

Dr. Scott, who has served as medical officer of health in Fulham, Barnsley, and Shipley in England, became medical officer of health of the London County Council in 1952. He succeeded Sir Allan Daley, whose deputy he had been since 1945. Dr. Scott submitted the report appearing here to the council's public health committee on January 27, 1953.

Daily average concentrations of atmospheric contaminants and daily temperature departures from 80-year average, London, November 16 through December 27, 1952.

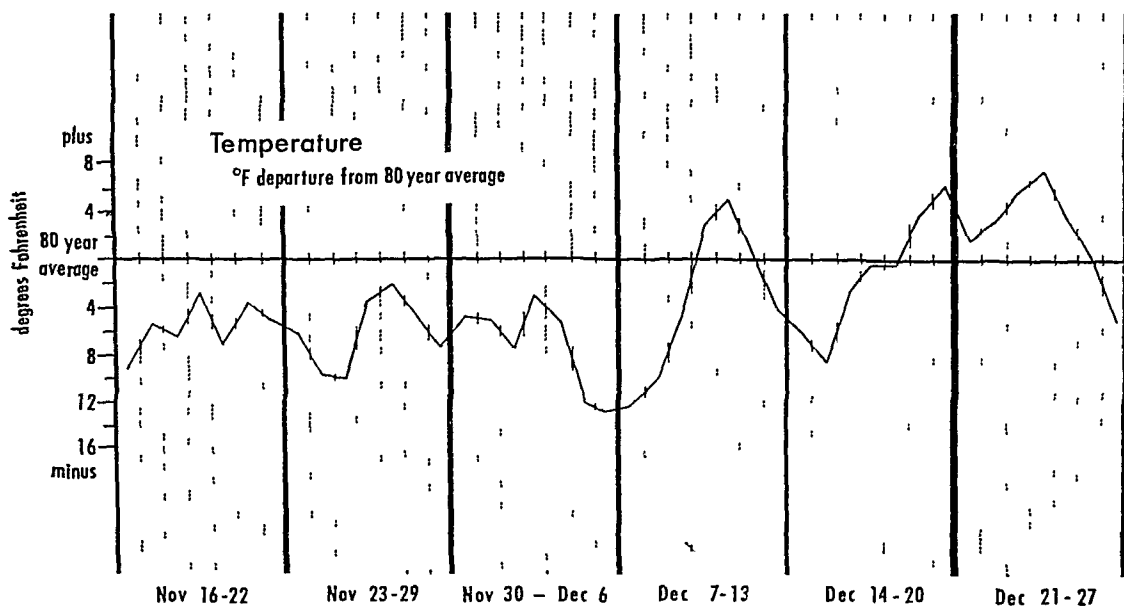
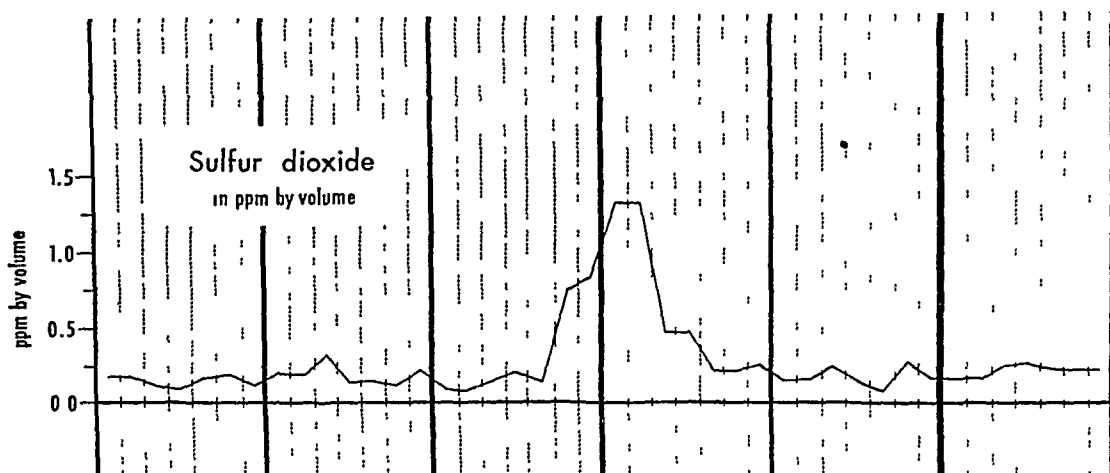
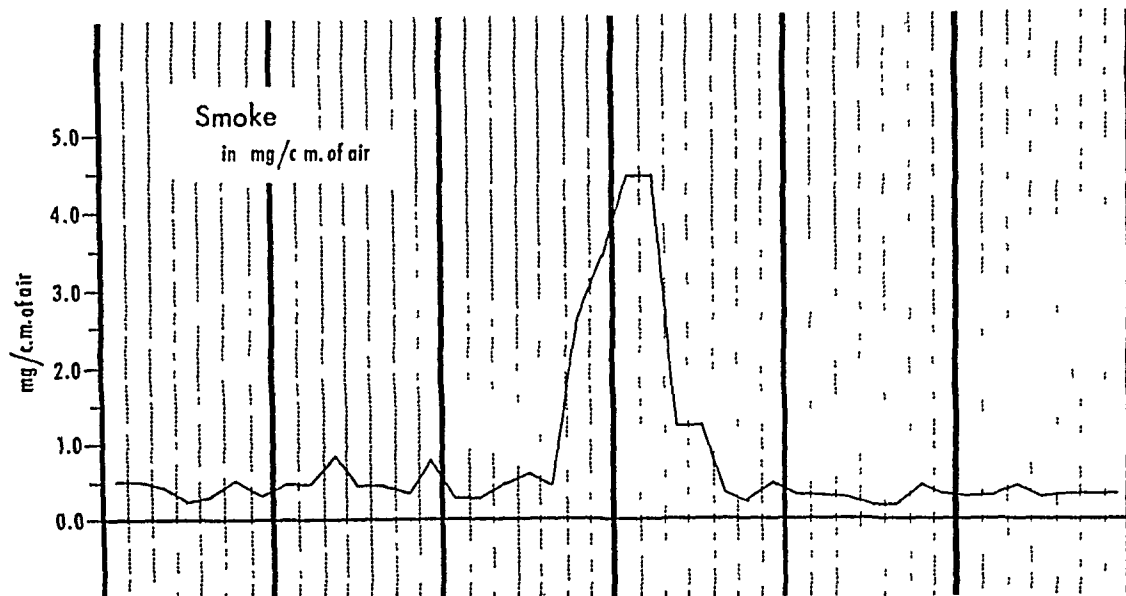


Table 1. Daily average concentrations of smoke and sulfur dioxide, according to observations at London County Hall, November 16–December 27, 1952

Day and date, November 1952	Smoke ¹	Sulfur dioxide ²	Day and date, November– December 1952	Smoke ¹	Sulfur dioxide ²	Day and date, December 1952	Smoke ¹	Sulfur dioxide ²
Sun., 16.....	0.53	0.179	Sun., 30.....	3.30	1.090	Sun., 14.....	.32	.155
Mon., 17.....			Mon., 1.....			Mon., 15.....		
Tues., 18.....			Tues., 2.....			Tues., 16.....		
Wed., 19.....			Wed., 3.....			Wed., 17.....		
Thurs., 20.....			Thurs., 4.....			Thurs., 18.....		
Fri., 21.....			Fri., 5.....			Fri., 19.....		
Sat., 22.....	.35	.114	Sat., 6.....	.45	.855	Sat., 20.....	.35	.173
Sun., 23.....	1.50	.193	Sun., 7.....	4.46	1.339	Sun., 21.....	.33	.170
Mon., 24.....			Mon., 8.....			Mon., 22.....		
Tue., 25.....			Tues., 9.....			Tues., 23.....		
Wed., 26.....			Wed., 10.....			Wed., 24.....		
Thurs., 27.....			Thurs., 11.....			Thurs., 25.....		
Fri., 28.....			Fri., 12.....			Fri., 26.....		
Sat., 29.....	.81	.233	Sat., 13.....	.50	.263	Sat., 27.....	.34	.231

¹ Expressed as milligrams of black suspended matter per cubic meter of air. ² Expressed as parts per million by volume. ³ Average for the time period included.

Increase in Deaths

The deaths registered weekly in the administrative county of London from November 16, 1952, to January 10, 1953, were as follows:

Week ending	Registered deaths
Nov. 22, 1952.....	753
Nov. 29, 1952.....	853
Dec. 6, 1952.....	945
Dec. 13, 1952.....	2,484
Dec. 20, 1952.....	1,523
Dec. 27, 1952.....	1,029
Jan. 3, 1953.....	1,372
Jan. 10, 1953.....	1,216

For the weeks ending November 22 and 29 and December 6, the number of registered deaths was normal for the time of year, although during the vagaries of the winter weather it is usual to find as many as 1,100 registered deaths in occasional weeks. But for the week ending on December 13 the number of registered deaths rose to a figure far above the normal winter maximum and, although somewhat less for the weeks thereafter, the number continued abnormally high. (The apparent drop for the week ending December

Table 2. Meteorological observations at Kew Observatory, November 16–December 27, 1952

Day and date, November 1952	Mean daily temper- ature (° F.)	Depar- ture from 80-year average (° F.)	Day and date, November– December 1952	Mean daily temper- ature (° F.)	Depar- ture from 80-year average (° F.)	Day and date, December 1952	Mean daily temper- ature (° F.)	Depar- ture from 80-year average (° F.)
Sun., 16.....	35.4	-9.1	Sun., 30.....	37.4	-4.8	Sun., 14.....	35.2	-6.0
Mon., 17.....	37.8	-5.5	Mon., 1.....	36.9	-5.2	Mon., 15.....	32.0	-8.8
Tues., 18.....	36.3	-6.8	Tues., 2.....	34.2	-7.7	Tues., 16.....	38.3	-2.8
Wed., 19.....	40.6	-2.9	Wed., 3.....	39.0	-3.3	Wed., 17.....	40.8	-3.3
Thurs., 20.....	36.5	-7.0	Thurs., 4.....	36.5	-5.4	Thurs., 18.....	40.5	-3.3
Fri., 21.....	39.2	-3.7	Fri., 5.....	29.5	-12.1	Fri., 19.....	43.9	+3.8
Sat., 22.....	37.9	-5.1	Sat., 6.....	28.9	-12.8	Sat., 20.....	45.5	+6.2
Sun., 23.....	36.7	-6.3	Sun., 7.....	28.9	-12.3	Sun., 21.....	41.5	+1.9
Mon., 24.....	33.3	-9.7	Mon., 8.....	31.5	-10.0	Mon., 22.....	43.0	+3.3
Tues., 25.....	32.7	-10.3	Tues., 9.....	36.0	-4.5	Tues., 23.....	44.8	+5.9
Wed., 26.....	38.5	-3.5	Wed., 10.....	43.3	+2.7	Wed., 24.....	46.9	+7.3
Thurs., 27.....	39.7	-2.0	Thurs., 11.....	45.1	+5.0	Thurs., 25.....	43.2	+3.9
Fri., 28.....	37.4	-5.1	Fri., 12.....	40.1	-1.1	Fri., 26.....	40.3	+1.2
Sat., 29.....	35.1	-7.1	Sat., 13.....	37.2	-4.2	Sat., 27.....	35.4	-5.1

Fog Over London

"A report on the London fog of December 1952 has now reached the London County Council and it makes grim reading. In the past hundred years only the peak week of the influenza pandemic in November 1918 produced more deaths over the expected normal than did the man-made fog of 2 months ago. Even the cholera epidemic of 1866 could not quite equal it.

"Analysis of the deaths registered shows that extremes of life were more affected than the middle groups and that the increase in deaths was associated almost entirely with disorders of the respiratory or circulatory systems. The January 31, 1953, issue of *The Lancet* contains an interesting account by a general practitioner of the effects of the fog on his Beckenham practice. Upper respiratory toxic irritation appears to have been common and affected the active as well as the older and less fit whilst lower respiratory affection occurred amongst the more elderly and those with a previous

history of chronic chest trouble. Dr. Fry notes that the majority of these illnesses started fairly abruptly on the third or fourth day of the fog.

"This combined picture of mortality and morbidity is similar to that presenting itself at Donora and in the Meuse Valley. It is the picture presented by the London fog of 1948 and it is a reiteration of what the medical officers of health of Glasgow, Leeds, Manchester, and other industrial cities have been reporting in greater or lesser degree from time to time for several generations. In other words, the London fog of December 1952 was no strange new phenomenon. It was no acute epidemic caused by a hitherto unrecognised virus nor was it a visitation of some known pathogen against which we had no defence. It was simply the occurrence of a well-known meteorological phenomenon in an area where the toxic products of combustion are vomited in excess into the air and as a result the upper and lower respiratory

systems of the local inhabitants were irritated and death occurred amongst those with pre-existing cardiovascular and respiratory disease.

"This is in parallel with typhoid at Croydon and Malden and paratyphoid at Bournemouth and Aberystwyth. What does it matter if in the one the vehicle was air and in the others water, milk, and ice cream? The result was the same. Epidemic illness of a preventable nature occurred. . . ."

—Excerpt from an editorial appearing in *The Medical Officer*, London, February 14, 1953, p. 73.

Other London fog reports appearing recently in *The Lancet*, include: "December Fog in London and the Emergency Bed Service," by G. F. Abercrombie, January 31, 1953, pp. 234-235; "Effects of a Severe Fog on a General Practice," by J. Fry, January 31, 1953, pp. 235-236; "Mortality in the London Fog Incident, 1952," by W. P. D. Logan, February 14, 1953, pp. 336-338.

27 is due to the usual delay in registration over Christmas and not to a decline in deaths.)

The general death rate for the week following this fog and cold was slightly greater than that associated with the severe fog of 1873 and was comparable with the rates experienced at the peak mortality of major epidemics, as shown in table 3.

It is apparent that although the death rates immediately following the fogs of 1873 and 1952 were almost the same, the increase was much greater in 1952. The increase in 1952 was larger even than that attributable to cholera in the

week of highest mortality in the summer of 1866.

Deaths by Age and Cause

Analysis of the deaths registered weekly from November 16 through December 27, 1952, shown in table 4, indicates that the sudden increase in mortality, although more pronounced among infants and the elderly, was not confined to persons of any particular age. Among infants aged 4 through 52 weeks and among persons over 55 years, three times as many deaths were

Table 3. Registered deaths per million inhabitants in the administrative county of London during specified weeks

Week ending	Deaths	Normal for period and season	Excess over normal
Aug. 4, 1866 (cholera).....	876	450	426
Dec. 20, 1873 (fog).....	713	470	243
Nov. 9, 1918 (influenza).....	1,085	300	785
Dec. 13, 1952 (fog).....	745	300	445

registered in the week ending December 13 as could be expected from the figures for the previous 3 weeks, and among persons of all other ages, rather over twice as many.

The causes associated with the excess deaths were confined almost entirely to disorders of the circulatory or respiratory systems (see table 5). Compared with the average per week for the previous 3 weeks, deaths from bronchitis in the week ending December 13 were 10 times as many; from pulmonary tuberculosis, $4\frac{1}{2}$ times as many; and from other respiratory diseases, nearly 6 times as many. Deaths from cancer of the lung rose rather less, to nearly twice as many; those from disorders of the heart and circulatory system were nearly three times as many. Deaths from any other defined

cause showed no significant increase with the exception of gastroenteritis, deaths from which increased considerably among children under 1 year old; it is, however, quite possible that these cases of gastroenteritis were secondary to an upper respiratory infection.

This sudden high mortality did not alter the normal pattern of deaths from the different causes at different ages except insofar as it was an increase confined to respiratory and circulatory diseases; at no age were any excess deaths registered from causes which are not normally characteristic of that age during winter. Deaths from influenza, although they rose markedly in the week after the fog, rapidly fell back to a normal winter level and at their highest were well below the numbers to be expected in a developing epidemic.

Detailed comparison of the deaths following the fogs of 1952 and 1873 is not possible owing to considerable changes in the methods of classifying causes of death. But it is clear that the effects were broadly similar. In 1873 as in 1952, it was the respiratory and circulatory diseases which showed the greatest jumps in mortality; and in 1873, although the death rates increased at all ages, the increase was much greater among the very young and the old. An accurate comparison between the se-

Table 4. Registered deaths in administrative county of London, by age group, week ending November 22 through week ending December 27, 1952

Age	Number of deaths for week ending						Average number of deaths per week for weeks ending November 22, 29, and December 6	Percentage of average of first 3 weeks for week ending		
	November 22	November 29	December 6	December 13	December 20	December 27		December 13	December 20	December 27
Weeks										
0-4.....	13	22	16	28	19	12	17.0	165	112	71
4-52.....	5	9	12	26	15	11	8.7	300	173	127
Years										
1-4.....	11	5	6	7	13	7	7.3	96	177	96
5-14.....	4	3	4	6	6	2	3.7	164	164	55
15-24.....	4	3	9	7	14	7	5.3	131	263	131
25-34.....	14	7	16	28	17	11	12.3	227	138	89
35-44.....	28	22	36	64	29	34	28.7	224	102	119
45-54.....	85	61	80	204	96	83	75.3	271	127	110
55-64.....	118	152	157	448	251	167	142.3	315	176	117
65-74.....	229	226	254	717	444	258	236.3	303	188	109
75 and over.....	242	313	355	949	619	437	313.3	303	198	139
All ages.....	753	853	945	2,484	1,523	1,029	850.3	292	179	121

Table 5. Registered deaths in administrative county of London, by certain causes, week ending November 22 through week ending December 27, 1952

Cause	Number of deaths for week ending						Average number of deaths per week for weeks ending November 22, 29, and December 6	Percentage of average of first 3 weeks for week ending		
	No- vember 22	No- vember 29	De- cember 6	De- cember 13	De- cember 20	De- cember 27		De- cember 13	De- cember 20	De- cember 27
Pulmonary tuberculosis	18	19	14	77	37	21	17.0	453	218	124
Lung cancer	38	27	45	69	32	36	36.7	188	87	98
Heart disease	225	272	273	707	389	272	256.7	275	152	106
High blood pressure	12	17	19	47	36	21	16.0	294	225	131
Other diseases of circulatory system	27	23	26	46	31	32	25.3	182	123	127
Influenza	1	7	2	24	9	6	3.3	720	270	180
Pneumonia	31	28	45	168	125	91	34.7	486	363	264
Bronchitis	46	73	76	704	396	184	65.0	1,083	609	283
Other respiratory diseases	10	8	9	52	21	13	9.0	578	233	144
Ill-defined causes	19	26	25	79	35	37	23.3	339	150	159
All other causes	326	353	411	511	412	316	363.3	140	113	87
All causes	753	853	945	2,484	1,523	1,029	850.3	292	179	121

verity of the 1873 and 1952 fogs cannot be made since no recordings of the condition of the atmosphere are available for 1873. But some idea of their relative intensities can be obtained since it so happens that in both years the fog occurred while the Smithfield show was being held, and in both years deaths of animals in the show were recorded. The *London Times* of December 12, 1873, reported that about a third of the animals had to be removed; that some were saved by being carried quickly into the clearer air of the country but a considerable number had to be slaughtered; and that asphyxiation of animals occurred in London cow-houses and in the metropolitan market on De-

cember 11. In 1952, the breathing difficulties experienced by otherwise healthy animals owing to the foggy atmosphere received wide publicity.

Summary

During the week following the fog and very low temperatures of December 5, 6, 7, and 8, 1952, abnormally large numbers of persons at all ages died from causes connected with difficulty of breathing. This was very similar to what had happened immediately after a comparable fog in 1873, but the rise in deaths in 1952 was much greater and was, in fact, as great as that during the worst week of the last cholera epidemic.



"Widening the Road to Health" was the theme of the eighth National Conference on Rural Health sponsored by the Council on Rural Health of the American Medical Association. More than 700 medical, farm, and community leaders, representing several million rural area people, attended the conference at Roanoke, Va., February 27 and 28. Our report of the meeting begins with a review of conference activities since 1946 by Dr. Crockett, chairman of the Council on Rural Health. It includes in news-summary form reports of seven other papers and, in brief, a review of rural dental problems. Two additional briefs summarize the viewpoints on rural health councils of a physician and of a State public health director. These were given at a preconference meeting of State committees on rural health. The seventh National Conference on Rural Health was reported in Public Health Reports, May 1952, pp. 479-483.

Looking Back To Look Ahead in Rural Health

By F. S. CROCKETT, M.D.

A REVIEW of the past 8 years may help us in forecasting where we go from here. Let us, in part, recreate the atmosphere in which we lived in 1945. A great world war was ending. Nearly all civilian activities had suffered change and dislocation. This was especially true in health and medical care. Some 60,000 physicians had entered the armed services, in many instances leaving communities without a physician or with an aging one.

Earlier, in the midthirties before World War II, the decreasing number of physicians in the small towns was impressive. This phenomenon had been slowly developing since the beginning of the century. The element of need seemed increasingly urgent. The big question was what could be done about it?

Dr. Crockett, Lafayette, Ind., is chairman of the American Medical Association's Council on Rural Health.

The American Medical Association formed a committee on rural health, predecessor of the present council, in response to an invitation from the American Farm Bureau Federation, an organization representing at that time about 1 million families from farms in practically every State. Individual physicians were fully aware of the rural health situation and were anxious to make available all the resources and information in their possession required for study and solution of the problems.

In the organizational plan for the medical profession eight areas of rural America having comparable rural health problems were recognized. A member of the committee living in each area was given responsibility for developing rural health activity suitable and acceptable to the people in the area. This intimate knowledge of sectional problems was augmented by advisory members. We first invited advisory members from the Farm Bureau, Grange, Co-operative Milk Producers Federation, Farmer's

Union, and Farm Foundation of Chicago. Later the Committee on Policy and Planning of the Land-Grant Colleges and the American Agricultural Editors Association gave us advisory members. We have received recognition and support from constituent State medical societies. Forty-three State rural health committees have stimulated interest in providing service for their rural areas. They have done much to organize State and local health councils, enlisting the support of a large segment of the citizens. The State committees have received major support from many sources, especially farm organizations, which have also organized State and local health committees.

Ground Rules

Into conferences such as this one flow the combined thinking and planning of the rural and professional leadership of the whole country. This combination of skill and experience justifies our claim that rural health promotion has become truly a citizenship responsibility—a duty resting upon each citizen to contribute, to the fullest extent of his knowledge and experience, the wisdom required to make any community effort succeed.

The first national rural health conference, held in Chicago in March 1946, had several unique features. For instance, it was not a meeting of physicians to solve a health problem. It was a meeting of physicians and laymen to discuss and solve their mutual health problems—tacit recognition that rural health is a job for the citizen and that it requires community cooperation. The conference was national in scope—some 3,500 invitations were extended to all groups thought interested in the problem. Nearly every State was represented.

The ground rules for the conference called for an open forum in which everyone was free to express his opinions. It was believed that through a multitude of ideas a more complete picture would evolve. The conference was exploratory with no preconceived ideas to be supported. Discussion from the floor was deemed

important, equal to the prepared addresses.

The American Medical Association, while sponsoring the conference, claimed no privileged position. Constructive criticism was expected and desired. There were to be no decisions by majority vote. Truth cannot be established that way. Instead, areas of agreement were sought. Disputed problems have often found solution with the passage of time and more experience. These ground rules have not been changed. They apply with equal force to this eighth conference.

Three statements epitomize some of the thinking at the first conference.

The late Ransom Aldrich of Mississippi, first chairman of the Rural Health Committee of the Farm Bureau, pointed out, "The chief problem of medical care in rural America is cost. In my county, doctors charge a dollar per mile. The low income group in rural America simply does not get medical service from that kind of charge."

Dr. L. W. Larson, North Dakota, a member of our committee, remarked, "Rural health has always been a problem. While there has been considerable improvement, two phases remain unsolved—the availability and the cost of medical care. (a) Availability means bringing the doctor to the patient or the patient to the doctor. (b) The cost will be less if the patient can go to the doctor. The use of prepayment plans will spread the cost and reduce the cost to the individual."

Leland B. Tate, of the Farm Foundation, proposed that better medical care and health service, and health education should bring to the individual: (a) "Knowledge and understanding of what is desirable for maximum health, and (b) insight into ways and means of getting and paying for adequate health and medical services."

Three basic factors, that still concern us, were noted and emphasized at the first conference: medical services; the maintenance of health through education of the individual; and the economic situation that exists at the moment affecting various segments of rural people.

The Common Effort

There are, in part, the progressive steps by which we have built the National Council on Rural Health and mobilized existing related professional, educational, and civilian groups for a common effort on the national, State, and local levels. What then is this common effort?

Our objective in this common effort has been the benefit of the individual and his community. The technique to be employed was, we believed, important—as important as is the objective. This benefit was not to be had free, but was to be earned by the community and by the individual. By this technique, based on rugged individualism, on personal pride in one's ability to care for himself, on meeting common problems through group action, the objective was to be won.

This basic philosophy and the methods employed in its achievement reflect the thinking of the medical profession. I believe it is acceptable to our advisory groups. We have given much thought to this whole matter. Where does the local physician, of the county medical society, fit in? True, they are the experts in health matters, but no community problem can be solved by a minor segment of the population.

We have come to believe that this is not the physician's job; it is not a job for the medical profession; it is not a public health service job; it is not a layman's job. It is a job involving all citizens collectively and equally—one in which each contributes for the common good his knowledge and experience and in return shares in a better place in which to live and rear his family.

We believe we should take advantage of the strength accruing from group action. Citizens organizations lend themselves well to health promotion, and many have been formed on the county basis in many States.

The trading center, and its surrounding trade area, is the logical health council area. It has been observed that people get medical services where they go for other commodities and services. Since the county is a convenient area surrounding the trade center, or county seat, we have come to call these local organizations county health councils.

County health councils are truly local. This is the area where people live. This is where they can conduct their local and community affairs to suit themselves. This is the level where local self-determination permits the fullest expression of individual thinking. Schools, churches, highways, public health services, law enforcement—everything entering intimately into daily living—reflect the individual's attitude toward, and concept of, his responsibilities as a citizen.

A county health council should be organized whenever a large majority of the local leaders and local citizens are ready for it. In Indiana, for example, 34 counties out of a total of 92 have health councils. Some have been very active; others shade down through varying degrees of activity. What we need in Indiana is an overall State organization interested in stimulating well-directed activities originating locally in response to local needs. A number of States have such State health councils. They have followed no set pattern, but each has contributed richly to the fund of general experience.

Any organization able to accomplish what the people want done is a good and sufficient organization. It is a well-recognized principle, however, that the best public opinion exists where the greatest number think as we do. Any organizational plan that secures a favorable public opinion and wide popular support is to be preferred. This is the way our common effort can be, and has been, implemented. This is the highway we wish to broaden now.

Steps on the Road

A brief review of the succeeding national conferences will complete the picture of our progress.

The second conference studied methods of bringing and holding doctors in rural areas; building hospitals and diagnostic facilities; medical care for low income families; and prepayment plans for medical and hospital care.

The third conference considered the health problems of rural youth. We learned that the country was no better and no worse than the

city. Each to be a healthful place to live must utilize well-known health measures.

The fourth conference studied the rural and farm environment; the accident rate; animal diseases affecting man; soil depletion effects on nutritive crops; and use of newer chemicals in pestilence control and possible poisonous effects.

The fifth conference was the first to be highlighted with a theme. A courageous "Let's Do Something About It" dominated the program thinking in 1950. It was pointed out that the community health council, if properly organized with broad interests, wide support, and wise leadership, will supply the channel through which any community can solve its own health problems in its own way and to its own satisfaction.

"Why Wait—Let's Do It Ourselves" was the sixth conference theme calling us to further action. Success stories of State and county health council accomplishments cited examples of vision, leadership, and energy exhibited under the stimulus of good neighbor and good citizenship practices. It was a dramatic confirmation of previous years' studies and recommendations.

The theme at last year's seventh conference of "Help Yourself to Health" was an action slogan in the best rural tradition. Discussions of successful planning in a number of States, and recitals of "take home" ideas garnered from the program, afforded ample opportunity for thorough discussion from the floor.

Accomplishments

The national conferences have created a receptive climate for a number of developments. Several come readily to mind such as Blue Cross and Blue Shield and Farm Bureau and Grange sickness insurance; Hill-Burton aid to hospital construction; placement service for physicians in communities wanting physicians; nurse recruitment plans; organization of State and county health councils, and organization of rural health committees by State and county medical societies.

Health educators have been added to facul-

ties of several land-grant colleges. At least two States have emphasized general practice training of medical students. Some State plans include graduate instruction which will bring the medical school to many rural physicians who cannot leave their patients without medical care while taking refresher courses.

Surveys of local health conditions by lay personnel in local health councils, under professional guidance, is a most revealing activity. We have survey reports from Columbiana County and Clinton County, Ohio; Parke County, Ind.; and Madison County, Idaho. No doubt there are other reports that have not reached us.

The compilation of much pertinent material by the Council on Rural Health, available on request to the council's secretary, should prove helpful to anyone developing a home program.

Another accomplishment of the council which has done much to strengthen and give common direction to many agencies interested in promotion of better health for rural America has been the addition of a field director to the staff. Members of the council are all working physicians who take time off from earning a living whenever they do anything to promote this cause. This limiting factor has been removed by having a full-time representative whose duty it is to go into every State and acquaint all interested persons and groups with the council and with each other. In obtaining a field director, or roving ambassador, the council's effectiveness has been enhanced manyfold. We like to refer to him as our catalytic agent, so many desirable reactions result when he is around that somehow never happened before.

A unity of purpose and performance by all of us engaged in stimulating rural people to attain a fuller and more healthful life is created by our knowing each other better and working together. This is one of our objectives.

In charting the direction we have traveled these last 8 years, we have been guided by a realization that we live in a real world; that each of us must live and act as a responsible person; that the world does not owe us anything except opportunity—opportunity to solve

our own problems in our own way and to our own satisfaction.

The Future Problem

Final solution of the three basic factors of medical care, health maintenance, and purchasing power uncovered at the first conference is our future problem.

Medical Care

Medical care is that service we require when we are sick. This we can not give to ourselves. We need well-trained doctors and nurses and well-equipped hospitals. Since 1946 this situation has improved. Many doctors have settled in the small towns. I doubt if there are now many prosperous communities, where desirable living conditions exist, without needed medical personnel. It is in communities in the lower income level that the greatest challenge exists—places where poor schools, churches, roads, homes, and farms go hand in hand with inadequate medical care.

Health Maintenance

Health is more than freedom from disease. It should have a positive quality, abundant and vital in character. We should think of health maintenance as consisting of all those things we learn to do for ourselves so that we can keep the good health we now have. This is our own responsibility. We owe it to ourselves. It is no other person's duty to maintain our health for us unless we become dangerous to the health of other people. The individual is capable of doing many things needed to maintain his health. Of course, there are some health problems that require community action. The local public health service was created for this purpose and needs and deserves the support of all citizens. It is an official body created and governed by law. A volunteer organization is more resilient. It can make and change its own rules to meet quickly any emergency. There is much that such a citizen's council can do to make everyone health conscious. This is not a new or untried idea. In many counties in a number of States such groups have done excellent jobs

in cleaning up health hazards and teaching the simple rules of health.

Purchasing Power

The third basic factor involves purchasing power—the “take home pay” in rural areas. Price parity is equality of earning opportunity. Its realization would go far to solve the medical care problem and payment for the service. There are today few prosperous rural communities without needed medical coverage. However, they too will benefit from local organization. There is more to this problem than getting a physician and paying him for his skill. Public opinion can be mobilized in support of many improvements in hygiene, sanitation, and other health measures.

Sharing and spreading the costs of medical care through insurance is of interest to everyone, rich or poor. In the purchase of goods and services, a sliding price scale cannot be applied as it is in taxation. Great progress continues in the insurance coverage of rural people and we can entertain a reasonable hope of the eventual coverage of 60 percent or more of those who should have it. The greatest challenge is how to bring the benefits of prepayment to the 40 percent.

To these problems, there is no easy, simple answer. All the points I have made are debatable. There is an honest difference of opinion. But there is much evidence warranting the conclusion that the future trend is away from “statism”, with a return to individual initiative, to voluntary organization on the local, State, and national level for the meeting of social needs. The promotion of local organization for this purpose by the past seven conferences seems timely and even prophetic as we view it now.

We must continue to encourage county or community organization. Continuing education is the best method for achieving our goal of individual and local self-help. It is the sure foundation for State and national solution of health and other social problems. There is no substitute for a well-informed citizenry.

In taking a long look ahead, physicians will do well to follow Dr. Louis H. Bauer, president

of the American Medical Association. Recently he urged the expansion of voluntary health insurance to cover the aged (those over 65 years of age) and those suffering from illness of long duration; promotion of volunteer organizations so that we can have a better distribution of physicians through establishing needed facilities; making good medical care for the indigent available everywhere; extension of public health coverage to areas lacking it; and protection of the public so that people may always obtain the services of a physician.

During the past 8 years we have been making progress in line with these suggestions and the potentials are much greater than anything that has been accomplished up to now. We are given an unprecedented opportunity for service to society. Our goal is the well-served, well-informed community. We must reach our goal by showing that the way along the ever widening highway to health is gained by patient and sturdy trudging. It is not a journey that can be made by thumbing our way.

Highlights of the Conference

Group Health Insurance Advised for Farm Families

Group health and accident insurance gives farm families an economical way of meeting medical care costs, Carl S. Mundy, M.D., Toledo, Ohio, vice chairman of the Council on Rural Health told the Eighth National Conference on Rural Health.

Dr. Mundy pointed out that group coverage with payroll deductions is the most economical form of insurance. This method, he said, has been adopted by many industrial and business concerns.

"Since payroll deduction is impossible for farm families, some other satisfactory and economical arrangement must be made to collect and forward premiums for the group," he added.

Farm organizations and church groups have served this purpose, he said. "Enrolling all the depositors in a rural bank and authorizing the bank to deduct premiums from the contract holder's account and to forward them to the insurance company is another method that is working well in many communities. The prime requisite in each instance seems to have been imagination and leadership."

Dr. Mundy stated a group must be not only qualitatively representative, but quantitatively it should in-

clude more than 50 percent of the farm families in a community or locality.

He also pointed out that the farmer would have a more economical and better coverage for his purpose if he took advantage of the deductible principle which eliminates the insurance of small, frequently recurring and unpredictable items.

"The greater the number of small items we permit to remain in this deductible category, the cheaper will be the insurance," he said.

According to Dr. Mundy, the hospital bill probably will be the largest item in the cost of a major illness. Surgical fees are usually the second largest item when surgery is performed.

"There are many sources of insurance available," he said. "Commercial carriers operate in most States. In many States there are companies sponsored by the Farm Bureau, the Grange, or both. These, together with Blue Cross and Blue Shield, offer a variety of contracts that should satisfy the needs of most groups."

Facts on Food Values Needed in Rural Areas

Farmers need to know more about food values, Janet L. Cameron, Blacksburg, Va., food and nutrition

specialist for the Virginia Polytechnic Institute's agricultural extension service, told the conference.

Miss Cameron reported that a survey in Appomattox County, Va., a fairly typical rural area, showed that three groups of foods were seriously lacking in the diets of more than half of the families. These are tomatoes, citrus fruits, and other vitamin C foods; milk and milk products; and green and yellow vegetables.

"Even though farm families usually produce much of their vegetables and part of their fruit and meat, the largest part of their income goes for food," Miss Cameron said. "Therefore, a big responsibility in nutrition is to help them understand food values in order to get the most for their dollars."

"It may help our people to know that green cabbage is now much cheaper than lettuce, yet just as nutritious; that pork liver is far more nutritious than sausage or ham, yet the cost is much less. By the same token, beef liver or heart has more iron and vitamins than beef steak or roast, yet it costs far less. If the cost of fresh milk limits the amount a family can use, canned or dry milk is equally nutritious."

"Lack of income may limit or prevent some families from getting an adequate diet, but most farm families can have a garden and produce enough vegetables to give them two

... of food which studies show they lack."

Focus on Youth

Miss Cameron said progress in nutrition since World War I has prevented or alleviated dietary deficiency diseases, such as: curvy, rickets, and simple goiter. Synthetic nutrients have made it practical to improve common foods as a means of preventing deficiency diseases in large populations, she added.

Studies show that the poorest fed member of the family is the adolescent, especially the girl, Miss Cameron pointed out, adding: "Somewhere along the line we have failed to establish in her the good eating habits of her childhood, or we have not helped her to see the importance of nutritious foods for her happiness and success in the years ahead."

New Hospital Achieved By Community Action

The record of a small town—with a population of less than 5,000 people—successfully passing three bond issues to build a 55-bed hospital was reported by Lilyan C. Zindell, Perryville, Mo., administrator of the Perry County Memorial Hospital.

Everyone seemed to want to participate in the project, Miss Zindell said. The Missouri Farm Bureau Federation gave a helping hand. Former residents of Perry County living in St. Louis also contributed.

The hospital has attracted four young physicians into the community. In less than 2 years, 800 babies have been delivered without a maternal death. Local businessmen and farmers serve on the board of trustees, she said.

Hospital Volunteers

Since the hospital was opened a group known as the "hospital volunteers" have sewed several thousand items needed by the hospital and have served as receptionists. Currently, they are working to create a student loan fund for use by young people in the community who go into

schools representing the professions that, combined, make the hospital team.

Miss Zindell urged other communities to consider the financing of the medical education of qualified local youths as a means of assuring a supply of doctors for their areas.

Community Shows Way To Get Physician

Huddleston is a Blue Ridge mountain town in Bedford County, Va. Its population of about 250 is hardly enough to cause a physician to give it consideration as a place to practice.

But the people of Huddleston were of the opinion that they needed a physician, and they were determined to get one. Six months ago, they did. Now, they have a clinic which they helped erect and where a young physician serves from 250 to 300 patients a week. These patients come from a widespread area.

The story of community enterprise which changed the medical care picture of the small town and its surrounding country was told by Earl J. Shiflet, Richmond, Va., State deputy of the Virginia State Grange.

The story is this:

In the spring of 1951, the newly organized Otter Grange of Bedford County included in its community program plans for obtaining a physician.

Organizational Help

A request was made of the Bedford County Medical Society to ascertain whether there was need for a physician in Huddleston. Within 10 days, the society reported there was a need and expressed the opinion that a physician could develop a good practice.

The Virginia Council on Health and Medical Care gave the community a list of physicians seeking a place to practice, and Huddleston was placed on the council's list as desiring a physician. Among those

contacted was a 29-year-old 1951 graduate of the Medical College of Virginia, who interned in the Norfolk General Hospital, and was seeking his first location.

The Otter Grange, in its planning, was joined by the Parent-Teacher Association and by other groups in the community. The young physician visited Huddleston and showed an interest. The community offered to make certain provisions in order that he might be able to start his practice without too great a financial burden upon himself.

Build Clinic

A trust company was formed to represent the community in an agreement with the physician. It was decided that the physician should have a clinic in which to practice and a desirable place in which to live. The physician was consulted on the type of clinic, and it was agreed to build a cinder block building consisting of a reception room, an X-ray room, doctor's office, examining room, and a laboratory. It was to be rent free the first year, after which \$500 a year was to be paid. The physician was to receive first option on the purchase of the clinic within 10 years.

An old, used school building near the clinic was converted into a comfortable and attractive residence for the doctor and his family at a \$70 monthly rental.

Mr. Shiflet paid tribute to the physician, saying:

"This was his first practice. He was setting up practice in a strange community. He was strictly on his own in a new kind of medical experience, with no one to fall back upon for advice. He had a family to provide for.

"First, and most important, he started off by giving good medical service to his patients. Residents of the community will testify to this.

"He has followed a strenuous schedule, sparing nothing to meet the medical needs of his people. He has purchased good equipment to in-

sure good medical attention. He has endeavored to make the clinic comfortable and attractive.

"Patients coming to the clinic are received by a charming receptionist. To complete the staff, the doctor has employed a trained nurse to work with those receiving medical attention. To make everything as convenient for the patient as possible, an X-ray machine has been installed and drugs are available at the clinic."

Small Town Practice Chosen Over Big City

Seven years ago, a 32-year-old physician in the Army Medical Corps figuratively tossed a coin. Should he, after being discharged from service, enter into general practice in a small town in the Ozark Mountains, or should he undertake further study to become a psychiatrist in a big city?

The Ozarks won. Today, Mountain Home, Ark., has a family physician who is happy in his surroundings although the road traveled was a rough one. This story was told by B. N. Saltzman, M. D., of Mountain Home, Ark.

A 1940 graduate of the University of Oregon Medical School, Portland, Dr. Saltzman, like many other young physicians, entered the Army after his internship. By 1946, he had accumulated sufficient discharge points to consider leaving the armed services. He was stationed in the Canal Zone at the time.

He heard that the town of Mountain Home, with a population of about 2,000 and located in the north central part of Arkansas, needed a physician and that the residents were willing to go to great lengths to make things suitable for a good medical practice.

Facilities Offered

There was no hospital, but he was informed that a modern office would be provided and equipped. A home would be made available to him

and his family, and there would be a new car.

"I would, of course, have to pay for these things later, but all I had to do now was to start practicing," Dr. Saltzman said.

He went to Mountain Home, where he found there was no modern office available and no equipment; there was no home available in the town, and his query as to a new car was met with expressions of "great glee and wonderment."

But another physician in the town, who was retiring because of ill health, turned his small office over to Dr. Saltzman and acted as his sponsor. Dr. Saltzman's savings went for the purchase of a small house still under construction; his old car had to do for another year. Sleeping quarters were established in the back of the office. After 4 months, he was reunited with his family.

There was no lack of patients, however, Dr. Saltzman said. The difficulty was in finding time to care for them. "My obstetrical practice flourished, and soon I was delivering as many as four babies a day in the homes."

Home vs. Office

Dr. Saltzman stated that he had to overcome the prevailing idea that the doctor should come to the home rather than that the patient should come to the doctor's office. Eighty percent of the house calls were useless and costly to the patient because of time and distances involved, he added. After modernizing his office and installing a laboratory, he began to educate his patients to come to him. Soon thereafter, Dr. Saltzman stated, his practice grew so rapidly that help was needed. He acquired an associate.

Then, the need for a hospital became more and more apparent. However, the building of it was left to the doctor. A hospital was completed 3½ years ago. It has 12 small private rooms for patients. Home deliveries are now a thing of the past; house calls have been cut to a minimum. Dr. Saltzman and his

associates are seeing more people than formerly, although their work has been cut in half.

The University of Arkansas Medical School has selected him as a preceptor—a teacher of young physicians who are given first hand experience in the problems and rewards of general practice in rural communities.

Dr. Saltzman gave suggestions for communities which are in need of a doctor: let the doctor be invited by organized action of community leaders willing to back up their promises—don't needlessly work the doctor to death; he's human; provide a small community-owned hospital, open to all reputable physicians in the area.

Helicopter Suggested To Transport Patients

The helicopter as a possible means of transporting patients from sparsely settled rural regions to hospitals where every facility is available was suggested by Louis H. Bauer, M. D., Hempstead, N. Y., president of the American Medical Association.

"In Korea," Dr. Bauer said, "patients are transferred by helicopters from the front lines in a very short time to hospitals where every facility is available. This is something to be considered by certain rural areas."

Dr. Bauer said that the Council on Rural Health is filling a long-felt want in acting as a liaison with other organizations to improve rural health conditions.

"Now all groups are cooperating in an effort to bring the highest standards of medical care to these areas," he said. "No one organization can do the job by itself. It requires a community effort."

Attracting Physicians

"One of the difficulties in the past has been the developing of some means to attract physicians to those regions lacking them. A physician

city for 8 to 13 years of his life. Being trained to practice modern medicine is not willing to settle in an area where there are no facilities for practicing such a type of medicine. Increasing the number of physicians will not do it, as they would still tend to congregate in cities.

"In some States, the problem has been solved by the community providing medical facilities and then permitting the physician to rent those facilities or to buy them through gradual amortization. Where this has been done, physicians have been obtained."

He also pointed out that in these days of good roads and automobiles a physician can cover a wider territory than before and is able to take care of more people.

"Every community does not need a hospital so long as one is available within a reasonable distance and good roads lead to it," he added.

More GP's Needed

Dr. Bauer expressed the opinion that medical schools should train more general practitioners, and that general practice should be a prerequisite for specialization. The AMA House of Delegates, he said, has directed that a committee be appointed to study this matter.

"Our voluntary insurance plans must be made available to rural people," Dr. Bauer stated. "Public health facilities must be extended to cover all areas so that there will be universal protection against communicable disease; protection of food, milk, and water supplies; elimination of disease-bearing insects, and adequate environmental sanitation."

Auxiliary Interested

Mrs. Ralph Easden, Long Beach, Calif., president of the Women's Auxiliary to the American Medical Association, reported that the auxiliary membership, composed of 60,000

physician's wives, is actively engaged in the promotion of rural, industrial, and school health; prepayment medical care plans; health education; civil defense; and promoting good legislation.

Joint Action Cited

At a meeting of State medical committees on rural health held on the day preceding the annual conference, Walter B. Martin, M.D., Norfolk, Va., a member of the American Medical Association's board of trustees, said that the cooperation being shown by physicians and representatives of the people they serve is a splendid example of how a democratic people accomplish their objectives. "The problems of rural health are being worked out not by compelling laws, but by joint action of physicians, the public health services, and the people of the community," Dr. Martin stated.

Medical Care Insurance Seen as a Responsibility

Medical care insurance is missing from many family budgets because some individuals fail to assume full responsibility for their own family health and welfare, declared Frank W. Peck, Chicago, managing director of the Farm Foundation.

A person who neglects to plan his affairs to meet unforeseen contingencies has himself alone to blame, according to Mr. Peck.

He excepted the indigent, the aged, and persons otherwise unable to provide for themselves. Government has a role in helping these people, he said. However, he added, there has developed a growing opinion during the last quarter of a century that "preparing for the proverbial rainy day is old fashioned."

Medical care provisions are missing from many budgets, Mr. Peck pointed out, because a family may have had little experience with seri-

ous illness; their income is already being "stretched to the limit," because, in some instances, of the lack of understanding between "needs" and "wants," or they may have a tendency to "cross the bridge when they come to it."

He placed farm families with respect to attitudes toward budgets into four groups: those who budget and who may or may not include expenses for medical and dental care; those who dislike budgets because they find difficulty in keeping within them, or because of the self-discipline involved; those who are "getting along all right" and are willing to let "well enough alone"; and those who believe they will be taken care of, and look to the community or government to do it.

Education Needed

Mr. Peck offered "education" as the solution, stating: "This education includes appeal to logic and reason. It represents the teaching of values and benefits. It represents facing the economic facts of life, particularly in a business that has extraordinary risks and uncertainties. It belongs in the extension system of adult education."

Reporting on the activities of his organization, he said: "The Farm Foundation directs its educational effort to a better understanding of all plans and processes. It holds that only as rural people and medical men study and plan together will rural health programs be developed which will result in rural people raising their health standards while preserving those freedoms that are cherished by both farmers and medical men.

"In a situation so complex, difficult and dynamic as that of rural health in the United States, satisfactory solutions to all the problems involved are not to be found quickly. These problems have been developing for generations. Their solutions will require time, thought, effort, skill, cooperation, understanding, good will and patience."

County Health Councils And Public Health

PHR Recognition of the essential dignity of each individual has been my guiding principle both in the private practice of medicine, in which for years I earned my living, and in public health practice, my present activity.

I should think that this basic principle would dictate the decisions of other private or public health practitioners. In fact the more difficult the decision the more we ponder about what will best befit the dignity of the individual. This is a theme worth keeping as we go forward in bringing better health to this Nation.

Without question the interest of rural groups will help bring better health not only through securing physicians for rural areas, but also through greater emphasis on preventive medicine and public health. It is also true that the presence of a local health department helps attract private physicians to rural areas. They realize that private practice has lost nothing and gained much through sound local health department services.

Physicians have limits of physical endurance. They do their best work only after families are well informed and when the families carry out their obligations by maintaining personal hygiene, environmental sanitation, proper nutrition, immunization, and by consulting the physician early rather than after complications have arisen.

Traditional functions of a local health department are vital statistics, control and prevention of communicable diseases, environmental sanitation, laboratory services, protection of maternal and child health, and health education. Another field now coming into the scope of public health was described by Dr. Thomas P. Murdock, AMA trustee from Con-

necticut, in an address to the Association of State and Territorial Health Officers last December. He said, "The field now covers many of the long duration illnesses such as rheumatic fever, chronic arthritis, cancer, crippled children, syphilis, care of the blind, and diabetes."

The Common Meeting Ground

Daily, in outpatient departments and wards of hospitals, physicians see patients in whom the neglect of health has produced minor problems of disease and patients in whom the neglect of disease has produced major problems of illness. By taking an interest in these minor illnesses at a time when the patient is ready to listen to advice, the physician has a golden opportunity for the practice of preventive medicine. We, in public health, probably need to close the gap between the level of health education and recent improvements in the training and tools with which physicians work. Patient education is an important part of public health education because sick persons are concerned primarily about their own health, and to be concerned is the first step in learning. Patients want to know what happened to them, why it occurred, and to what extent they are responsible for their illness. The best education is still transmitted from one person to another in a heart-to-heart talk.

The health council actually is a projection of the concept of preventive medicine from the State level down to the community. That is where the laity, physicians, and the public health team find a common meeting ground to begin the solution of their community health problems. These problems change with time. We all know that a different pattern exists now from the one of the early-day health officer, who was thought to be mostly occupied with tacking up varicolored signs appropriate for each communicable disease.

The Community Health Council can approach disease prevention through fact finding and interpretation of needs, resources, and problems. It can formulate standards and promote their acceptance. The council can mobilize the forces and interests in the community for sup-

By Franklin D. Yoder, M.D., M.P.H., director of the Wyoming State Department of Public Health, Cheyenne.

port, extension, and improvement of necessary services and facilities. It can help integrate related services, eliminate duplication of services and those for which there is no longer a need, and modify established services in keeping with new knowledge and changing community needs. Through central planning, informational, and referral service, the council can help promote full coordination and cooperation.

The importance of the participation of practicing physicians in community health council work cannot be overemphasized. Participation keeps physicians in touch with community health problems and enables them to give intelligent guidance to their solution.

In Wyoming we find several factors which produce interest in organizing a health council. In communities that want a public health nurse, a health council can help explain the benefits of this type of service to the people. Other communities may want to obtain a physician, they may want to take community action in eliminating a stream pollution or air pollution nuisance, or they may find it advisable to work toward building a hospital through the Hill-Burton program. Community health councils have been effective in these projects. Other conditions may help crystallize a health council in the communities of other States.

Put Into Practice.

Health education is one of our broadest and brightest avenues to better health. An illustration of how health knowledge was put into practice by a western Nebraska family was given at last year's rural health conference.

The mother had suffered a broken arm, and the children, ages 6 to 14, had taken over. They planned the meals, taking into consideration the basic food elements and good sanitation. They policed the medicine cabinet for dangerous medicine, and they were justly proud of their new plumbing system and the disposal unit, safely located. Flies were under control and rodent control was so well in hand that even the cat couldn't find a mouse. The cows had been tuberculin tested (brucellosis wasn't mentioned), and the children were figuring how to

pasteurize the milk. They had studied the soil in relation to the trace minerals and the other elements and to human nutrition. The family had health insurance and were helping with the preparation of an office building for a physician who was coming to their community.

In health education, as in other respects, the community health council can help in the development of good health practices on the part of our rural residents.

The Place of the Physician In Rural Health Activities

PHR The physician's place in rural health activities is out in front. If physicians do not accept leadership in these activities—if they abdicate the role of guidance and direction which falls to them by training and responsibility—they forfeit not only a share of their influence, but also the right to criticize and judge the efforts of laymen who do interest themselves in this important field.

The rural health picture is not a single, simple one. It is a montage of many pictures, one that will vary from region to region, and from State to State. The whole environment of any given area—the climate, the soil characteristics, the stage of social and educational development, the types of landholding, and the level of transportation and communication—all these, and others, make up the facets of the greater picture.

The medical problem is not the only one in the rural health picture, and medicine alone—either in personnel or facilities—does not necessarily present the principal solution to these problems.

To illustrate, the doctors of the rural South, not so long ago, spent endless time treating

By Charles Reid Henry, M.D., chairman, rural health committee, Arkansas Medical Society, Little Rock.

pellagra. But when the whole health team—the laboratory nutritionist, the research chemist, teachers and leaders in information work, agricultural researchers, and the skilled field workers of the extension service—joined in the prevention of pellagra, it disappeared as a medical problem and as a health and economic factor. A great health program was overcome, not by bedside care—but by teamwork under medical leadership.

Of first importance in health activities, not only locally but at every level, is the attitude of the physician toward all the people and agencies available as allies in rural health efforts. The intelligent physician will let it be known that he welcomes all helpers in the field. He will not resent them as “busybodies,” or be contemptuous of the layman’s approach.

The typical physician—and the country doctor always—complains that he is terribly overworked, and can usually back up this complaint with facts and figures. But how often does he assess the whole situation around him which engenders his complaint? How well does he marshal others who might well lighten his load by helping to improve the circumstances—the larger health situation in which he works? Generally, the physician’s responsibilities in rural health activities are the same as those of any conscientious man interested in the welfare of his community, but the physician’s responsibilities extend further. In the smallest or unorganized communities, he may have to add to some degree the duties of sanitary engineer, epidemiologist, dairy and meat inspector, and quarantine officer. In larger communities, he will act as a watchdog to see that such functions are carried out faithfully.

Leadership Assignment

The mental curiosity and perception necessary to the successful completion of a medical education should naturally lead the physician to an awareness of health problems in his particular setting. He should further implement this awareness by sincere and eager cooperation with all the groups and agencies concerned with education, information, and community improvement. He should equip himself with a

knowledge of techniques used successfully in other areas to uncover and attack such problems.

In Arkansas we have proved at our rural health conferences that the Extension Service, the Home Demonstration Council, the Farm Bureau Federation, the dental association, the public school administrators, and the Woman’s Auxiliary of the Medical Society are all waiting for the go-sign from the local physician. They are all willing to do the legwork, paperwork, and the doorbell ringing necessary to gather facts on community needs. They are almost unanimous in assigning the physician number one place in planning and directing such activities. They will do the work, but they feel lost without his leadership and advice.

If the physician feels unequipped to exercise such leadership and to advise soundly, it is his duty to get the information necessary to initiate such activity, either from his State society rural health committee, from the American Medical Association, Council on Rural Health, or from libraries.

Planning and advising are not enough. No one can take the physician’s place to speak with authority on medical matters; he cannot assign decisions and interpretations on such matters to nonmedical personnel, no matter how willing.

The physician must assume his personal share of information and educational activities. These will involve, in most instances, talks before groups eager to get sound information on subjects affecting their health and medical needs. Careful preparation of talks will pay good dividends, both in effectiveness and in good will. Farm people of today, whether cattle producers, members of home demonstration units or Future Farmers of America, are accustomed to technical information such as they see regularly in extension bulletins, farm and health magazines, and their newspapers. A grunt and an anecdote are no substitute for a factual well-organized talk enthusiastically given.

The Broader Area

He must not overlook his influence in increasing attendance and participation at regional or State rural health conferences. Probably more

than anyone else in the community, he can draft leaders who will bring back from such meetings the enthusiasm and the stimulation so vital to the spread of interest in these activities. He is, in a measure, the adhesive agent which binds the various community forces together in health matters. I cannot emphasize too strongly the almost militant willingness to help if only the physician will lead the way. The cooperation is readymade and all that is needed is the spark of physician interest.

State medical society officials, and especially members of State rural health committees, must see that information about rural health problems is spread to every local society and to every physician. The problem is not just one for "country doctors"—it is the concern, or should be, of every doctor in the State. The specialist, who receives patients from rural areas, has just as big a stake in the whole picture as has the general practitioner. His attitudes, his efforts become a part of the whole feeling of the people in his State in their appraisal of medicine and medical care.

Of course, the first duty of a physician is to his individual patients but more than that, it is the responsibility of his profession to safeguard the whole health and medical care situation as well as professional knowledge can do it.

Dental Aspects of Rural Health in Oregon

Editor's Note: Dean Noyes defined the major dimensions of rural dental problems and reviewed in some detail recent studies in Oregon. This "brief" excerpts from his paper a few of these significant findings and viewpoints which, as the author noted, may be of assistance to other areas.

PHR Dental rural health problems do not differ greatly in quality or type from those that are found in the urban areas, although there is some difference in the distribution of specific oral diseases in the country as compared with the larger

cities. Our greatest problem is presented by the relatively thin geographic distribution of people in rural areas, which makes it necessary to modify appraisal methods of rural dental health and the administration of treatment.

The techniques of recording the type or pathologic nature of dental disease among rural peoples are similar to that in the city, consisting of surveys using data collected by dentists, dental hygienists or trained lay persons; the records of dental practitioners; the clinical judgment of these practitioners.

When we appraise our preventive measures, we find our armamentarium is comprised of the same therapeutic measures used with respect to those who reside in the city. These include education for adult and child; through education, the dietary control of oral disease of both the hard and soft tissues, and the promotion of good oral hygiene; through the topical application of sodium fluoride, particularly for young people, and the introduction of fluorine into the water supplies, with resulting benefits to children. In rural areas these benefits are limited rather largely to the school population and the extent to which an individual or household can take advantage of this proven preventive measure.

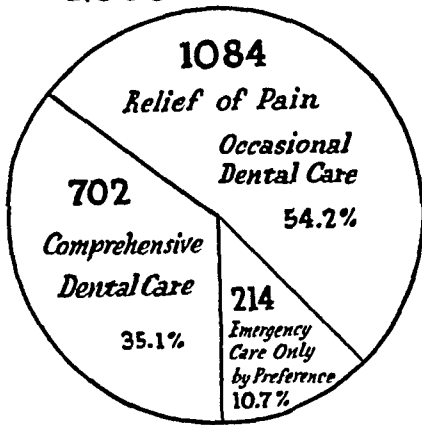
The advantage of fluorine in the water supply lies to a great extent in the early age at which it has effect. In other words, if we were limited to the topical application, even though we might be fortunate enough to make these applications to all the children of school age, fluorine in the home water supply provides the forming teeth of the child from birth to school age an advantage of even a greater degree of immunization.

I should like to mention, as well, the importance of early dental care. We may from time to time prevent serious problems if we take care of the little defects, and we can prevent serious and costly dental operations if we take care of the little things as the individual grows to attain maturity.

Now if we turn to the matter of treatment in rural areas, we find the same basic personnel as

By Harold J. Noyes, D.D.S., M.D., dean, University of Oregon Dental School.

Rural Demand For Dental Service 2,000 Inhabitants



in the cities except that here the personnel itself is spread over a wider area and the opportunity for choice of a dentist and the use of auxiliary personnel is far more limited. There are, of course, dentists who practice in small towns and the smaller metropolitan areas that are adjacent to farm and ranch country. In some cases, though far less than I would have expected, there is use of a dental trailer, which returns us to the itinerant dentists of the days of my grandfather, at which time it was not uncommon to have the dentist go around on horseback, or in a light wagon.

Dentists in metropolitan areas also have many rural patients, some of whom make it a business to come to the city periodically for dental care. Others combine dental attention with other business which they have in the city. This is difficult to arrange, particularly for young children, and it has other disadvantages. Auxiliary personnel—dental hygienists and dental assistants—likewise abound to a greater degree in the more heavily populated areas.

Rural Needs for Dental Care

No clear line can be drawn between the rural and urban need for dental care. Nevertheless, people who live outside of corporate limits have a great handicap in access to dental personnel. Analysis of the dentist-to-population ratio in urban and rural counties of Oregon reveals a distinct difference.

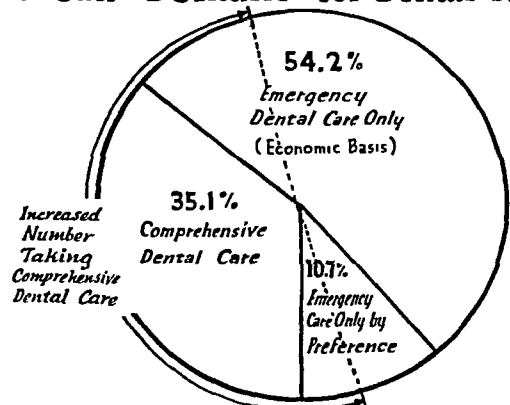
Similarly, we must recognize the very real distinction between the needed amount of dental care and that demanded by a given community. Dental care must be considered in its proportional relation to general health, and the cost of complete dental care of the residents of Oregon would require the expenditure of approximately \$73,178,475 for the accumulated dental defects which exist at the present time. The annual cost of complete care for each year's increment of dental ills will approach if not exceed \$22,581,061. If there were dental personnel to provide these services, which there is not, the expenditure alone would be unwise if not impossible.

There exists a very real correlation between dental care purchased and the per capita income of the community. A similar relation, though less positive, exists between the educational level of a population and the willingness to procure dental services.

Effective Demand in Oregon

What, then is the effective demand in Oregon for dental care? The net income of 54.2 percent of the 61,188 farms in Oregon in 1945 is reported to be below \$1,500 annually. Persons who receive half of the necessities of life from their produce may be expected to purchase little more than emergency dental care. Of the remaining 45.8 percent no less than 10.7 percent will refuse all but emergency care, leaving but 35.1 percent who will have the means and in-

Urban Demand for Dental Service



clination to seek complete or nearly complete dental health service.

To deserve his consideration as a vocation among those open to young men and in order to make a livelihood which compensates him for educational expenditures a dentist must have approximately 700 patients that require his services for more than emergency care. Thus a dentist who is looking for a location in a rural community in the State of Oregon cannot consider any situation which does not offer approximately 2,000 inhabitants unless the average family income expectancy is above \$3,000 annually. Under average conditions he can postulate that 1,084 persons will not be able or willing to utilize his services for more than the relief of pain or occasional dental care; 916 will be able to do so, but of that number 214 will be unwilling to go beyond the extent of the first group; and he will have to rely upon the remaining 702 for his stable living (see "rural demand" chart).

In November 1952, there were 992 dentists licensed and practicing in Oregon, which has 1,521,341 persons (1950 census). This represents a ratio of one dentist to each 1,534 people. There are now 27 dental hygienists practicing in Oregon. A statement of this sort must be interpreted in terms of the availability of service to the individual who wishes dental care. In the urban area of Multnomah County, for example, the ratio is 1 to 935, while in Polk County it is 1 to 5,137, and in Sherman and Wheeler Counties, there are no dentists reported by the State Board of Dental Examiners.

Moreover, this does not mean that each person in Multnomah County has 1/935 care of one dentist. It means only that the persons who are willing to purchase dental service have attracted dentists to this area in that proportion. Why can a dentist find it to his advantage to serve in a 1/935 ratio in Multnomah County, when he cannot afford to risk location in most rural areas where he will be one dentist to 2,000 people? Because the segments of the circle are altered and the percentages changed in the urban area of Portland (see "Urban demand" chart).

The 35.1 percent who have the resources and

desire for dental care extend into the 10.7 percent that will not seek dental care. Moreover the 35.1 percent are sufficiently convinced of the value of this service that they will pay a higher premium for it. This means offering a greater bid for dentists than the same segment of rural population. Also, the 54.2 percent who feel that their circumstances justify only emergency care and limited service is transformed in part by dental health education and public social acceptances in such manner that they feel dental services deserve greater priority in their limited budget.

The Manpower Problem

Of the 992 practicing dentists in Oregon we can expect to lose 24 in 1953, if we accept the actuarial figure of O'Rourke (see chart). We may expect to lose, as well, 21 dentists who will leave Oregon to locate elsewhere. Anticipating that 75 percent of the Oregon residents whom we graduate in June of 1953 remain in the State of Oregon, we will increase our total by 35, and probably gain at least 5 Oregon graduates from out of State. We have the added opportunity for improving our ratio and compensating for such increase in population as may take place in the current year through the number of dental graduates from other dental schools who pass our State Board dental examinations and remain to practice in this State, estimated at 14. We could therefore expect to have 1,001 dentists in 1954, unless those taken by the Armed Forces are not replaced by veteran dentists who return to Oregon to practice.

Amplifying Service

There are additional ways in which the available volume of dental service may be amplified. The use of auxiliary personnel—dental hygienists, assistants, technicians—effectively increase the productivity of the dentist. Related is the use of two-chair offices and modern equipment, and of late very interesting studies have pointed to the increased hours of service they permit.

The data are irrefutable with respect to our ability, if we would utilize our present knowledge, to reduce materially the incidence of dental disease in children. It is possible where the

Effect of Auxiliary Personnel Two Chairs and Dental Health Measures on Available Dental Care in Oregon.

DENTIST TO POPULATION RATIO 1-1534 (Nov. 1952)

992	
Oregon Dentists (Nov. 1952)	
992	297
Increased Productivity With Use of Dental Assistant and 2 Chairs	
992	297 99
Effect of Oral Health Measures (10% Reduction in Oral Disease)	
992	297 99 193

Increased Productivity With Use of Dental Hygienists
Above Equivalent to Altering Dentist Population Ratio 1: 962

diet of a child can be controlled in an institution to practically prevent dental decay. Under present existing diets in the average home and with the almost insatiable desire which both children and adults have for sweets, this has not been practical in private homes. We should not, however, blame the dental profession for our inability to follow a dietary regimen which if implicitly pursued will make cavity formation negligible.

Likewise there is good reason to believe that the incidence of dental decay in children up to the age of 15 can be reduced approximately 40 percent by the topical application of sodium fluoride if the procedures advocated by the United States Public Health Service are pursued. However, the cost in the terms of a dentist's hours of time in applying sodium fluoride in his own office is about equivalent to that which would be required if he were to restore by fillings the cavities which he prevents. Here the use of a dental hygienist operating at a lesser hourly cost in the fabric of the public school system can perform a very important service.

We should not be misled, however, by thinking that a reduction in dental service required by children is a reduction in ultimate demand for care over the entire life span. While it is certainly important from the standpoint of esthetics and function and the effect which the latter has upon health, we must recognize that the retention of teeth may increase the problems which come from disease of their supporting tissues in the later years of life. We cannot,

therefore, look at preventive measures in childhood in any great degree as a reduction in the overall burden upon dental care.

It is conservative to say that at least 10 percent of the need for dental care could be eliminated if the public would practice conscientiously and consistently the procedures which are presented in the literature and provided in the schools and follow the advice that is given in dental offices and in the programs which are promulgated by units of the dental profession and the State departments of public health.

To document this estimate: a 3-year dental health education program in Greenville, Tex., resulted in a rate of 9.9 missing permanent teeth per 100 children. In comparison, Jacksonville, Tex., where no dental health education was operating, there were 26.2 permanent teeth missing per 100 children.

If We Applied What We Know . . .

On the basis of national survey data, about half of the 992 Oregon dentists are now using two-chair offices, and about 64 percent employ dental assistants. The effect of full utilization of these resources would be to add 297 dentists to the total dental service rendered Oregon.

If we could develop effective measures in dental health education, it would relieve the burden on the dentists who are practicing in the State to an extent equivalent to adding 99 dentists to the overall total. Finally, if we were to save the operating time of 992 present practicing dentists by using dental hygienists

Loss of Dentists Thru Death & Retirement	
Reference: OROU, W. J. T. JADA, 1944	
100 200 300 400 500 600 700 800 900 1000	
Oregon Dentists Nov. 1952	992
Anticipated Loss Nov. 1953	24
Anticipated Loss Relocation of Oregon residents out of State	21
Anticipated Gain July 1953 Oregon Residents	35
Anticipated Gain out of State graduates July 1953	5
Anticipated Gain other Dental July 1953 School Graduates	14
Total Loss	45
Total Gain	54

for the limited operations they are licensed to practice, we would in effect add 193.

In other words, applying tested procedures would change the effective impact of 992 dentists to a condition equivalent to having 1,581 and would reduce the present dentist population ratio from 1 to 1,534 to 1 to 962 (see chart).

To Increase Rural Care

There are several practical ways to increase rural dental services in Oregon. First, encourage local residents to study dentistry. There is a tendency to return to the area of residence for professional practice. This should be fostered, as should the challenge that dentistry offers in the field of human service.

Second, support the State department of public health, whose dental health officer can facilitate dental health education, stimulate dental health service programs, and implement local district dental societies.

Third, support the State dental school. If we are to meet our obligations and assist in the provision of increasing dental care in the rural and urban areas alike, we must continue

our progress in increasing the number and the quality of dental school graduates. At the same time, it is essential that through the study of public health problems and energy directed in dental research that assistance be offered in the distribution of dental service and in the perfection of measures and techniques which decrease the volume of dental ills.

Fourth, support local dentists. Earnest, conscientious professional men cannot exist nor can young men be encouraged to come to rural areas unless they can have the professional satisfaction of performing a comprehensive health service. They will be glad and willing, I am sure, to assist in the relief of pain, to perform extractions and emergency dental care and to construct full dentures, but if the rural areas are to compete with those of the larger cities in their bid for dentists it will be necessary to provide these men with the opportunity to administer dental service as a true health service and not on a basis of selling their wares over the counter upon the prescription of the patient, who is in no way qualified to make his own diagnosis or prescribe the expedient treatment.

Department of Health, Education, and Welfare Created

The Federal Security Agency became the U. S. Department of Health, Education, and Welfare on April 11, 1953. On the same day, Mrs. Oveta Culp Hobby was sworn in as the first Secretary of the newly created executive Department. Her nomination to the cabinet post was unanimously confirmed by the United States Senate on the previous day. Mrs. Hobby took office as Administrator of the Federal Security Agency on January 21, 1953.

As one of her first appointments, Mrs. Hobby named Park M. Banta of Arcadia, Mo., to the post of General Counsel. Mr. Banta replaces the former General Counsel of the Federal Security Agency, Mr. Alanson W. Willcox. After serving in the 80th Congress from the Eighth District of

Missouri, Mr. Banta practiced law in Ironton, Mo. Prior to his election to Congress, he served as administrator of the Missouri State Social Security Commission from 1941 to 1945.

Also, Mrs. Hobby has appointed Mrs. Jane Morrow Spaulding of Charleston, W. Va., as Assistant to the Secretary of the new Department. Mrs. Spaulding's wide experience in social welfare work includes service as State director of Negro relief for the West Virginia Relief Administration and the founding of the only private child-caring institution for Negro children in West Virginia. Mrs. Spaulding succeeds Mrs. Anna Arnold Hedgeman, a former assistant to the Federal Security Administrator.

Climate and Endemic Dental Fluorosis

By DONALD J. GALAGAN, D.D.S., M.P.H. and GLENN G. LAMSON, Jr., A.B.

INVESTIGATIONS demonstrating the relationship between trace amounts of fluoride in community water supplies, the prevalence of mottled enamel, and a reduction in dental caries experience have been extensive during the last half century. By 1931 it had been determined that mottled enamel was associated with the presence of fluoride in drinking water (1, 2). Subsequent studies revealed the direct quantitative relationship between fluoride and mottled enamel (3-6) and demonstrated the inverse relationship between fluoride and dental caries experience (7).

Based upon these data, using the community fluorosis index to measure the extent of mottled enamel (8), and the decayed, missing, filled (DMF) index as a measurement of caries experience (9), an optimum fluoride concentration was derived for use in the supplementation of fluoride-deficient community water supplies. The range of fluoride concentration most effective in preventing dental caries was established at approximately 1.0 to 1.5 ppm, well below the critical point in the causation of mottled enamel.

A review of the literature reveals that the recommended fluoride levels have been determined from observations made within a fairly limited geographic area, principally in the Midwest (10) where mean annual temperatures are approximately 50° F.

Temperatures in the continental United

States vary widely, from an average mean annual temperature of 40° to 45° F. in the northern tier of States to 70° F. and above in some areas of California, Arizona, Texas, Louisiana, and Florida (fig. 1).

In view of the temperature distribution in the United States, a fluoride concentration of 1.0 to 1.5 ppm seems justifiable for the major portion of the country. However, Arnold (11) has suggested that because of climatic conditions 1.0 to 1.5 ppm of fluoride may not be practical or desirable in every community, and Dean has recently indicated that less than 1.0 ppm of fluoride may represent the optimal level for dental caries control in a southern community (12). The early findings of the Smiths (13, 14), while not relating mottled enamel to climatic factors, certainly suggest that mild fluorosis is associated with less than 1 ppm of fluoride in certain areas in Arizona.

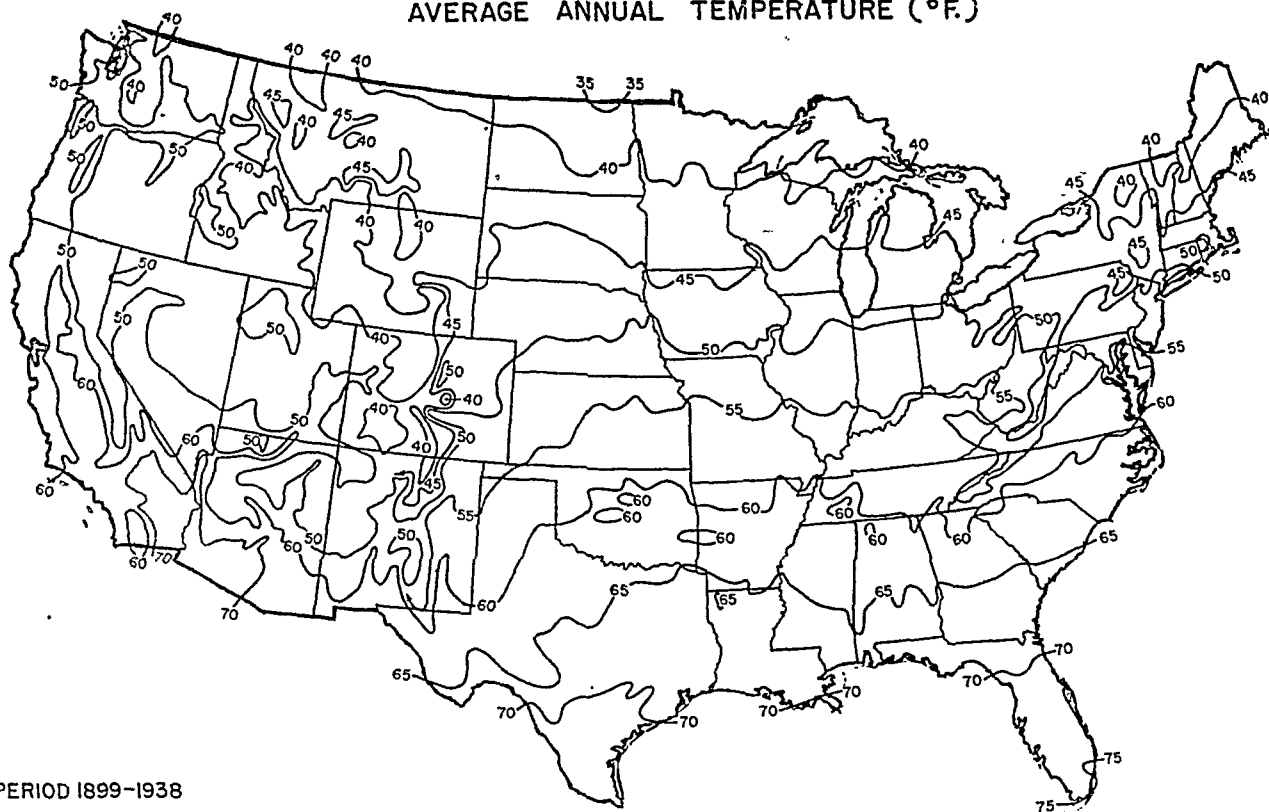
Recognition of a probable relationship between fluoride concentration and climate is being observed in the present fluoridation effort. For example, in the State of Wisconsin, 1.3 ppm is recommended. In Charlotte, N. C., the concentration of fluoride is varied from a high of 1.2 ppm in winter to a low of 0.6 ppm in summer, and in Florida, 0.7 ppm is the recommended optimum amount. Nevertheless, if climatologic factors markedly influence the water intake of infants and youth, additional information about optimum concentrations should be obtained for those exceptional areas experiencing extreme climatic conditions.

Since the severity of mottled enamel has a specific relationship to the fluoride content of water consumed, the application of a simple biological test such as a measurement of fluorosis

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Figure 1. Variations in temperature throughout the continental United States, 1899-1938.

AVERAGE ANNUAL TEMPERATURE (°F.)



PERIOD 1899-1938

SOURCE: U. S. Department of Agriculture, *Climates of the United States*. Yearbook Separate No. 1824, Washington, D. C., 1941.

may be used to evaluate water intake indirectly. In order to use this method of assessing climatic forces upon water intake, it seemed logical to measure fluorosis in communities with extreme temperatures. If objectionable fluorosis was not associated with fluoride levels around 1.0 ppm in the areas with extremely high temperatures, then that concentration would be desirable in the supplementation of fluoride-deficient water in areas with similar climate, and at least that amount would be required in all other parts of the United States.

Field Studies

The Arizona communities of Yuma, Tempe, Tucson, Chandler, Casa Grande, and Florence were selected for initial study. With the exception of Yuma these communities lie south and east of Phoenix on the plains of the Arizona Desert. Yuma is situated on the Yuma Desert on the northern edge of the Great Desert of Sonora, Mexico.

These six communities met the necessary re-

quirements for investigation. They had water supplies with adequate continuity and with fluoride concentrations ranging around 1.0 ppm. They were of sufficient size to yield a sample of native-born children large enough to be significant (15). They had mean annual temperatures ranging from 67° to 72° F., with an average mean annual temperature of approximately 70° F. This area is consistently reported as one of the hottest inhabited areas in the United States, exceeded in temperatures only by certain communities adjacent to Death Valley, Calif.

Public Water Supplies

The general characteristics of the water systems of the six study communities are shown in table 1. The data on fluoride determinations of the common water supplies of the six communities are presented in table 2.

These data were available as samples taken from individual wells and from the general distribution system after pooling. The arithmeti-

Table 1. Characteristics of the common water supplies in six Arizona communities, 1935-51

Community	Source of supply	Treatment
Yuma-----	Colorado River.	Desilting; aluminum sulfate; flocculation; copper sulfate; filtration; chlorination.
Tempe-----	4 wells-----	Chlorination.
Tucson-----	17 wells-----	Chlorination; ammoniation.
Chandler-----	4 wells-----	None.
Casa Grande--	5 wells-----	Do.
Florence-----	4 wells-----	Do.

cal mean of all available analyses of individual well water and of finished water has been accepted as the figure most nearly representing the fluoride concentration of the several water supplies. They represent analyses made intermittently from 1935 through 1950 and quarterly during 1951. The fluoride concentrations range from 0.4 ppm at Yuma to 1.2 ppm at Florence.

A more detailed description of each of the water supplies follows.

Yuma. The public water supply of Yuma has been obtained from the Colorado River since 1892. The treatment plant in current use was put into operation in 1945. The first treatment starts about 18 miles above Yuma, where a desilting plant is located. The main treatment plant is situated on the Arizona bank of the Colorado River in Yuma proper. A 4,500-gallons-per-minute turbine pumps water directly into the first settling basin in the plant. A second turbine, with a 5,000-gallons-per-minute capacity, pumps water from the Bureau of Reclamation canal, 1,200 feet away. Treatment at the plant consists of the addition of aluminum and copper sulfate, flocculation, filtration, and chlorination. Storage is obtained by means of two 500,000-gallon reservoirs from which the water is pumped into the distribution system.

(In the summer of 1937, sewage backed up in the Colorado River, and the water became unsafe for drinking purposes. During a 3-month period water from the City Park well, normally used to supply the municipal swimming pool, was pumped into the distribution system and supplied the water for the community. No data are available indicating the fluoride concentration of the well water at the time it was used for drinking purposes. but a

sample of the water as of May 12, 1951 showed 0.6 ppm.

The mean of 79 fluoride determinations shows the Yuma water supply to have a fluoride concentration of 0.4 ppm.

Tempe. During the study period the water for the community of Tempe was obtained from four wells. These wells, established in 1894, were located side by side, were pumped by a single piston, and were approximately 140 feet deep. No data are available to show whether they were cased, but the local waterworks operator thought they probably were not.

Finished water is stored in a 1,000,000-gallon tank. Chlorination was instituted in 1939; no other treatment is given. The average fluoride concentration for the common water supply is 0.5 ppm.

Tucson. The city of Tucson presented a special investigative problem. The water supply for the community is derived from more than one source, and is distributed through two systems, the Northside system with a fluoride concentration of about 0.3 ppm. and the Southside system with a fluoride concentration of 0.7 ppm. This study was concerned exclusively with the area served by the Southside system and hereafter will be the one under consideration.

The water for the Southside system is obtained from ground water in the Santa Cruz River basin. It is produced from 17 wells located south of the city on the east bank of the river (dry). The water from these wells is pumped into a 30-inch concrete conduit which carries it to two reservoirs, with

Table 2. Reported fluoride concentration of water from all available single source and distribution system samples in six Arizona communities, 1935-51

Community	Number of samples	Mean fluoride content
Yuma-----	79	0.4
Tempe-----	7	.5
Tucson-----	31	.7
Chandler-----	16	.8
Casa Grande--	20	1.0
Florence-----	22	1.2

SOURCES: University of Arizona, College of Agriculture, Agricultural Experiment Station, Tucson, Ariz.; U. S. Department of Agriculture, Bureau of Plant Industry, Soils and Agricultural Engineering, Salinity Laboratory, Riverside, Calif.

1,500,000- and 7,300,000-gallon capacities, respectively. The water is chlorinated at a point in the conduit before arriving at the reservoir. This is followed by ammoniation at 0.05 ppm.

Fourteen of the 17 wells were in operation prior to 1930. Two additional wells were placed in use in 1946, one in 1947. The wells are pumped alternately in the winter; in the summer, when demand is greater, all wells operate most of the time. The first 6 wells sunk are 125 feet deep. The remaining 11 extend from 200 to 300 feet in depth. Their individual output varies from 300 to 1,300 gallons per minute, with a total capacity of 9,000 gallons per minute.

Since 1938, when a set of control valves was installed to separate the two systems, no water has passed from the Northside into the Southside system. Prior to 1938, small amounts of water may have passed from the Northside into the Southside system. Since the fluoride concentration of the Northside system is the lesser of the two, the contamination of the water under investigation, if any, would result in a lowered fluoride concentration.

Only children who had continuous exposure to the common water supply of this community within a community were included in the study group. A buffer zone of three to five blocks was set up within the limits of the Southside system. Children were excluded from the study if they had lived in or beyond the buffer zone at any time. The normal range of a child at play probably is not greater than that; consequently, exposure to fluoride concentrations less than that of the Southside system would be casual.

The broken line on the map of the city of Tucson (fig. 2) shows the limits of the Southside water system as of 1935. The solid line indicates the area from which the study children were selected.

Chandler. During the study period the water supply for the city of Chandler has been produced by four wells. The initial two wells, 335 and 987 feet deep, were drilled and put into operation in December 1926. Both wells drew water from the 300- to 325-foot level, the depth at which they were perforated. In 1938 the casing above the perforations broke, and a considerably harder water began to enter the wells. Because of this, two new wells were put into operation, one in 1944 and one in 1948. They are both 650 feet deep, perforated from the 360-foot level to the bottom. The original wells were sealed off in September 1944.

The arithmetical mean of the fluoride determinations made while the original wells were in use is 0.75 ppm; of those made subsequent to that date, 0.85 ppm. The single analysis available for the period during which water was entering the wells from above the perforations indicates that the fluoride concentration at that time was 0.8 ppm the same as the numerical average for all observations. It seems clear that the fluoride concentration of the common water supply has remained constant during the study period.

Casa Grande. The water for Casa Grande is obtained from five wells, which were put into operation in 1922, 1930, 1937, 1946, and 1950. The location of each new well site was moved consistently to the northeast to get better water, but they are in fairly close proximity, all but one being within the city limits. The wells range in depth from 210 to 302 feet, with the exception of one 759-foot well which is used for emergency purposes only. No data were available as to the depth of the perforations in the well casing.

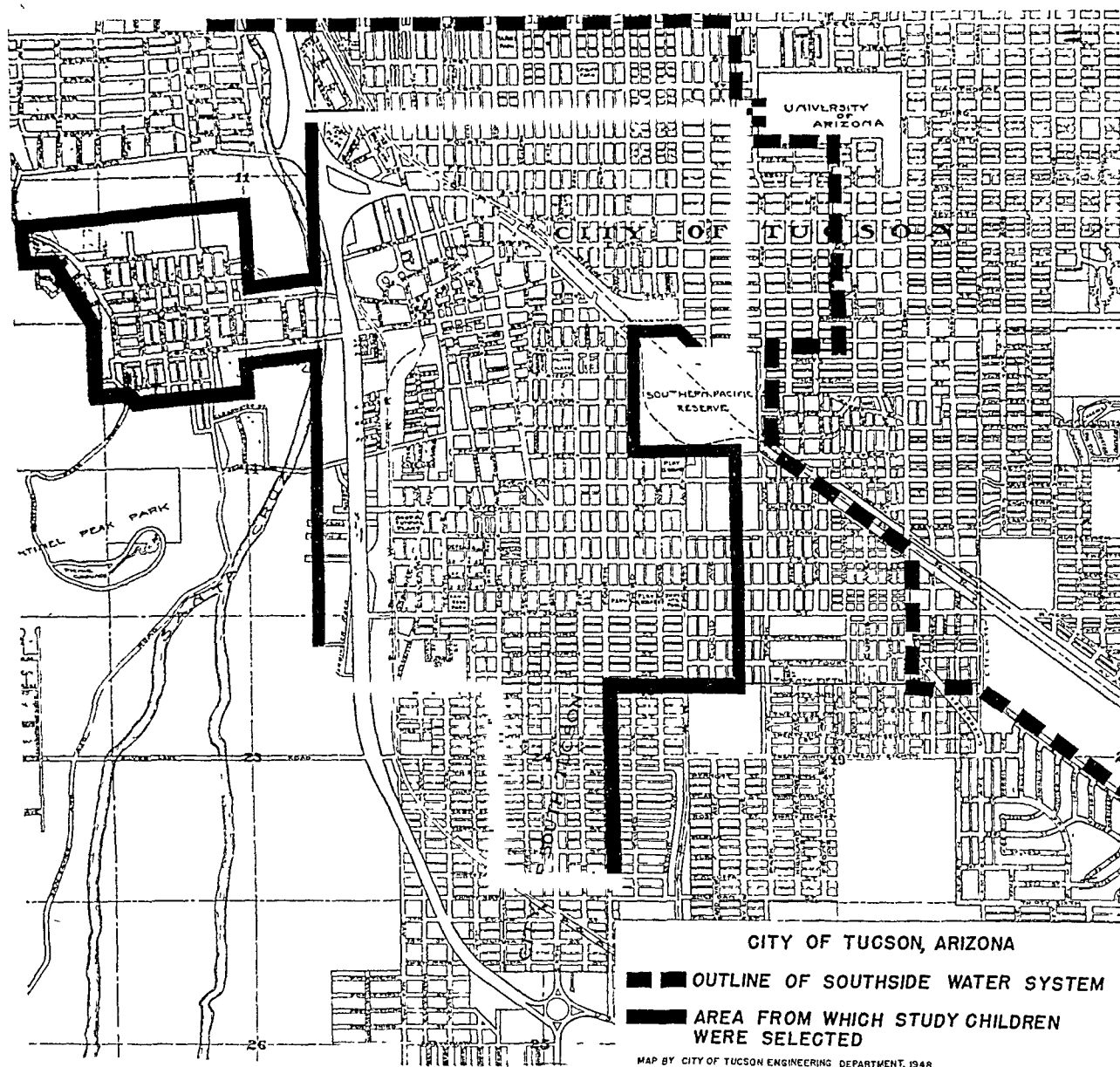
The wells have a total rated output of 1,700 gallons per minute with an average reported daily output of 594,000 gallons. The water is stored in a ground level storage tank of 500,000-gallon capacity and in an elevated tank holding 100,000 gallons. It is not treated.

The new wells added to the system during the present study do not seem to have changed the fluoride concentration of the water supply. Samples from the distribution system have ranged from 0.9 ppm to 1.2 ppm of fluoride. Twenty analyses, for the years 1931 through 1951, are available, representing all seasons of the year. The numerical average of all available fluoride concentrations reported for samples taken from the system and from individual wells is 1.0 ppm.

Florence. During the study period the community of Florence has obtained its water from four wells. The two original wells, 180 and 190 feet deep, were put into operation in 1919. A new 400-foot well, perforated the last 40 feet, was put into operation in 1939, and the two old wells were closed. Because of increased demand, another 400-foot well, perforated at the same level, was put into operation in July 1947. The new and the original wells are adjacent to each other within the city limits.

The wells now in use have a rated output of 350 gallons per minute, and an average daily output of

Figure 2. Map of the city of Tucson, Ariz., showing outline of Southside water distribution system, buffer zone, and area from which study children were selected.



386.5 thousand gallons per day. The water is not treated. Overflow is stored in a 55,000-gallon elevated standpipe.

Since there was a complete change in well usage during the early part of the study period, the available fluoride concentrations have again been divided into those taken prior to the date the old wells were closed, July 1939, and those taken after that date. A total of 21 fluoride analyses, with a numerical average of 1.2 ppm, was reported during the study period. Fourteen of the samples were taken prior to July 1939, and 7 were taken

after that date. Both average 1.2 ppm of fluoride. It seems evident that the fluoride content of the Florence water supply was not altered by the change in wells.

Materials and Methods

Since these studies were designed to determine the extent of dental fluorosis in children with continuous exposure to common water supplies containing low fluoride concentrations, it was necessary to get accurate information regarding the water history of the children

Table 3. Percentage age distribution of 726 children examined in six Arizona communities, 1951

Number of children in each community	Age (years) and percent in each age group							
	9	10	11	12	13	14	15	16
Yuma (82)-----	5	9	7	10	7	18	16	28
Tempe (113)-----	5	13	16	18	11	12	13	12
Tucson (316)-----	3	7	8	11	18	24	17	12
Chandler (95)-----	8	15	14	20	15	9	12	7
Casa Grande (50)-----	8	12	22	12	18	14	8	6
Florence (70)-----	3	9	9	16	18	14	20	11

studied. The following screening procedure was adopted in each community:

Screening Step 1. Public and parochial school children from the fourth through the ninth grades were each issued a card which asked the following questions:

Were you born in this town?

Have you lived here all your life?

Have you been away from this town for more than 30 days in any 1 year?

This initial screening served to eliminate those children obviously not continuous residents of the community.

Screening Step 2. Each child who indicated that he was born in the community and had lived there all his life was given a questionnaire to take home to his parents or guardian, with an explanatory letter. The parents were requested to record the birthplace of the child, the addresses of all his residences, continuously and in sequence, from birthdate to date of the questionnaire, and the source of the water used for drinking and cooking purposes at each residence. They were also asked to describe specifically the absences of the child from the community for more than 30 days.

Screening Step 3. Children who passed through the first two steps were scheduled for dental examination. At the time of examination, each child was questioned by a dentist or a dental hygienist to verify the information obtained in steps 1 and 2. A school or public health nurse was present to add her knowledge of the home situation to the water history data.

Screening Step 4. If the data obtained in any of the first three steps was inconsistent the parent

was interviewed by a member of the survey team and was asked to clarify the discrepancies.

Only children who had consumed water from the common municipal supply continuously from birth through their ninth year were included in the study. Children who experienced interruption in the continuity of consumption of the community water for periods of more than 30 days in any one calendar year were excluded. The remaining children served as study material.

Clinical Examinations

All dental examinations were made by the same examiner. The children were seated in a portable dental chair; and a mouth mirror, a Burton light, and compressed air were available for the examiner's use. Each tooth was assigned a fluorosis classification according to Dean (8). The tooth-unit fluorosis classification was later transposed into child-unit classification for use in computing the community fluorosis index. The percentage age distribution of the 726 Arizona children examined is shown in table 3.

Findings

The data relative to the prevalence and severity of fluorosis obtained in the six communities are presented in table 4. The occasional child falling into the moderate or severe classification when exposed to relatively low fluoride concentrations is worthy of note.

The community fluorosis index may be used for an objective measurement of the extent of endemic dental fluorosis. The direct relationship between fluoride concentration and fluorosis noted in prior investigations is evident. As the fluoride concentration rises the community fluorosis index is increased and the number of children without visible fluorosis is reduced. The community fluorosis index ranges from 0.21, associated with 0.4 ppm of fluoride at Yuma, to 1.12 for Florence which has 1.2 ppm of fluoride in its water supply.

Comparison With Midwestern Indexes

To compare possible variations in the intensity of dental fluorosis under different climatological conditions, data obtained from 10 com-

Table 4. Prevalence of fluorosis, distribution of signs of fluorosis and community fluorosis indexes in relation to fluoride concentrations of common water supplies continuously used by 726 children examined in six Arizona communities, 1951

Community	Fluo- ride con- cen- tra- tion	Number chil- dren exa- mined	Number chil- dren affected	Number of examined children with signs of fluorosis						Com- munity flu- oro- sis index
				Fluorosis absent		Fluorosis present				
				Normal	Ques- tion- able	Very mild	Mild	Moder- ate	Severe	
Yuma.....	0.4	82	3	53	26	2	1	-----	-----	0.21
Tempe.....	.5	113	11	59	43	10	1	-----	-----	.30
Tucson.....	.7	316	53	120	143	38	10	5	-----	.46
Chandler.....	.8	95	18	40	37	9	6	2	1	.52
Casa Grande.....	1.0	50	24	7	19	15	9	-----	-----	.85
Florence.....	1.2	70	39	17	14	18	10	9	2	1.12

munities with similar fluoride concentrations were selected from the study of "21 cities" by Dean and his co-workers (10). The communities in the 21 cities group, which may be considered as a base line, have a mean annual temperature of approximately 50° F., whereas the six communities in Arizona have a mean annual temperature of approximately 70° F.

Data on the prevalence and severity of fluorosis in both groups of communities are presented in table 5.

Comparison of the data reveals that the Arizona communities have a somewhat higher percentage of children affected by fluorosis than communities with a cooler climate and comparable fluoride concentrations in their water supplies. There is also a wider distribution throughout the fluorosis classification. Some of the Arizona children present moderate to severe fluorosis associated with exposure to less than the generally recommended fluoride concentration of 1.0 ppm.

Dean has stated that a community fluorosis index below 0.4 is of little or no public health concern. He considers the range from 0.4 to 0.6 as borderline. For indexes above 0.6 the removal of excessive fluorides from the water is recommended (8). From table 5 it may be seen that the fluorosis indexes for communities with fluoride concentrations above 0.5 ppm are considerably higher in the Arizona communities. Yuma, Ariz., and Marion, Ohio, both have fluoride concentrations of 0.4 ppm and fluorosis indexes of 0.21 and 0.25, respectively.

As the fluoride concentration rises, the disparity between indexes becomes marked, so that Florence, Ariz., and East Moline, Ill., with fluoride concentrations of 1.2 ppm, present fluorosis indexes of 1.12 and 0.49, respectively.

The fluorosis indexes for the two groups of communities have been plotted on figure 3.

The least squares method was used to calculate the index lines. (Trend line formula for 70° F. communities is $y = -0.291 + 1.132x$ and for 50° F. communities is $y = 0.021 + 0.353x$.) The line for the Arizona group has a much steeper slope than that representing the midwestern communities. The index line for the Arizona communities accelerates at approximately twice the rate as the one for the midwestern communities. The line for the midwestern cities crosses from the negative area into the borderline zone at approximately 1.1 ppm and from the borderline into the objectionable zone at 1.7 ppm. On the other hand, the line for the Arizona communities crosses from the negative area into the borderline zone at 0.6 ppm and into the objectionable zone at 0.8 ppm.

These data would indicate that the children residing in the Arizona communities under consideration develop twice as much fluorosis as midwestern children when exposed to water containing the same concentration of fluoride. (It should be noted that the two groups of children were diagnosed by different examiners. The data are therefore subject to the error of examiner differences.)

Climatological Variables

About two-thirds of man's total fluid intake is water, the remainder, other fluid substances. Except for temporary circumstances of an emotional nature, the amount of fluid ingested is determined by water deficiency. Every bit of body water lost must be replaced, and the replacement amounts are obligatory. (In growing children fluid intake may be slightly greater than water loss since some additional water is needed to build new tissues, but generally speaking, water intake and water loss will be equal over a 24-hour period.)

Temperature

Excessive temperatures result in a bodily demand for fluid over and above that usually

required for normal physiological processes (16). When environmental temperatures rise above skin temperature (92° to 95° F.), the only method by which the body can cool itself is vaporization. Heat loss can no longer be effected by radiation or conduction. The water output of the body is therefore increased in proportion to the need for increased vaporization. It follows that there will be an equal increase in the amount of water ingested in order to maintain body water balance.

The extremely high temperature occurring in the southwestern communities is undoubtedly a major factor contributing to the increased severity of endemic fluorosis observed in the Arizona children through its influence on water consumption. Some indication of the differ-

Table 5. Prevalence of fluorosis, percentage distribution of signs of fluorosis and community fluorosis indexes in relation to fluoride concentration of common water supplies of 16 communities in two temperature zones

Community	Fluo- ride concen- tration	Com- munity fluorosis index	Number children exam- ined	Percent children affected	Percentage distribution of signs of fluorosis						Mean annual temper- ature ° F. ¹
					Absent		Present				
					Normal	Ques- tionable	Very mild	Mild	Moder- ate	Severe	
<i>Arizona</i>											
Yuma.....	0.4	0.21	82	4	65	32	2	1	-----	-----	72.2
Tempe.....	.5	.30	113	10	52	38	9	1	-----	-----	68.6
Tuscon.....	.7	.46	316	17	38	45	12	3	2	-----	67.4
Chandler.....	.8	.52	95	19	42	39	9	6	2	1	67.6
Case Grande.....	1.0	.85	50	48	14	38	30	18	-----	-----	71.0
Florence.....	1.2	1.12	70	56	24	20	26	14	13	3	69.3
<i>Midwest</i>											
Marion, Ohio.....	.4	.25	263	6	57	37	5	1	-----	-----	52.1
Elgin, Ill.....	.5	.22	403	4	61	35	4	1	-----	-----	49.4
Pueblo, Colo.....	.6	.17	614	7	72	21	6	(2)	-----	-----	52.6
Kewanee, Ill.....	.9	.31	123	12	53	35	10	2	-----	-----	50.9
Aurora, Ill.....	1.2	.32	633	15	53	32	14	1	-----	-----	49.4
East Moline, Ill.....	1.2	.49	152	32	37	32	30	2	-----	-----	50.9
Maywood, Ill.....	1.2	.51	171	33	39	28	29	4	-----	-----	50.1
Joliet, Ill.....	1.3	.46	447	25	41	34	22	3	-----	-----	49.4
Elmhurst, Ill.....	1.8	.67	170	40	28	32	30	9	1	-----	50.1
Galesburg, Ill.....	1.9	.69	273	48	25	27	40	6	1	-----	50.9

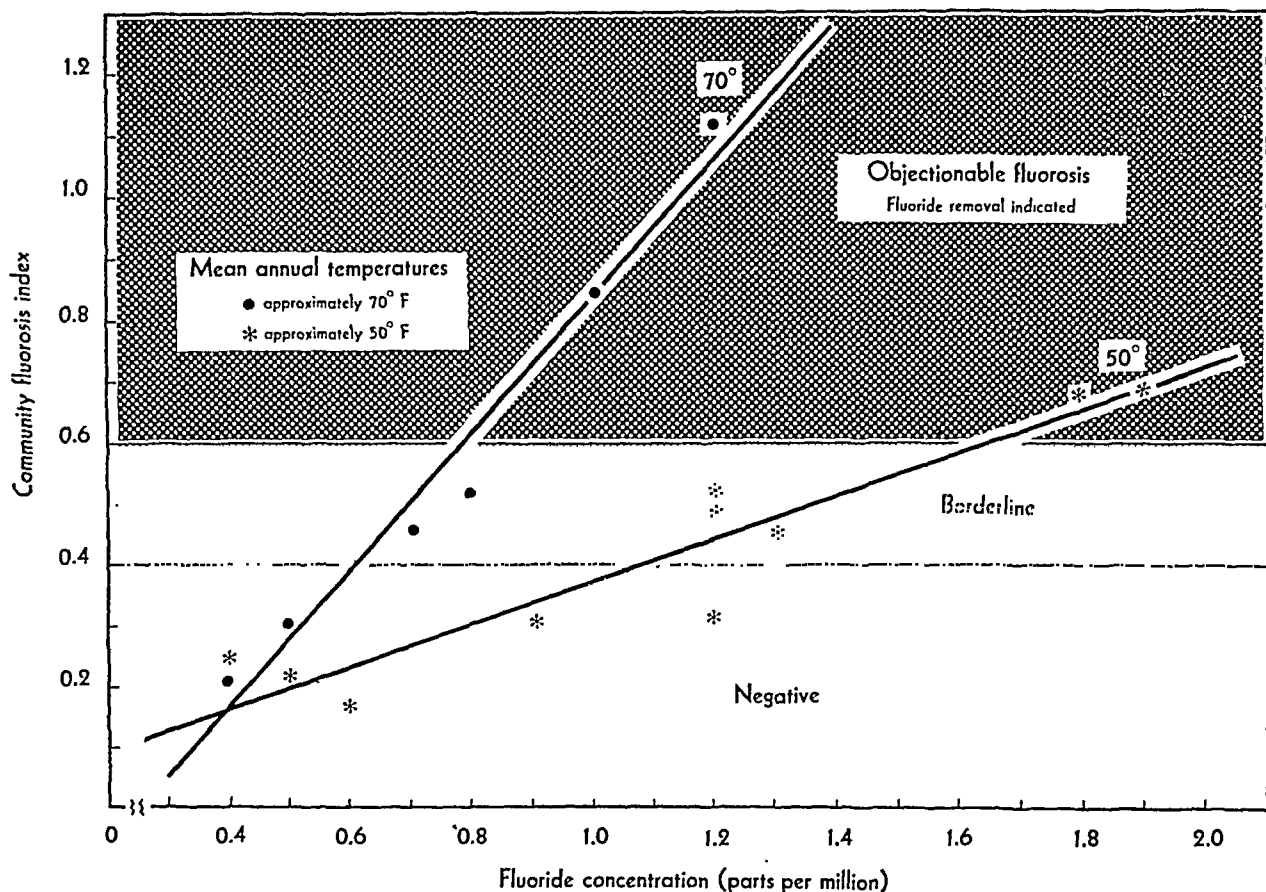
¹ Average: Arizona, 69.3° F.; Middle West, 50.6° F.

² Less than 0.5 percent.

NOTE: Age range for Arizona group, 9-16 years; midwestern group, 12-14 years.

SOURCES: Fluorosis data for midwestern communities from Dean, H. T.: Epidemiological studies in the United States. American Association for the Advancement of Science: Dental caries and fluorine, Science Press, Lancaster, Pa., 1946; mean annual temperature for 6 Arizona communities from Smith, H. V.: The climate of Arizona. University of Arizona, Agricultural Experiment Station, Bulletin No. 197, July 1945; for midwestern communities; from U. S. Department of Commerce, Weather Bureau: Climatological data. Monthly and annual summaries: The mean annual temperature for Aurora, Joliet, and Elgin is represented by the 19-year average mean temperature for Aurora; that for Kewanee, East Moline, and Galesburg by the 19-year average mean temperature for Galva; and that for Maywood and Elmhurst by the 19-year average mean temperature for Chicago.

Figure 3. Relationship between fluoride concentration of municipal waters and fluorosis index for communities with mean annual temperatures of approximately 50° F. (Midwest) and 70° F. (Arizona).



Source: Table 5.

ence in temperature between the two geographic areas is reflected in their mean annual temperatures of 50° and 70° F. (table 6).

Temperature Range

The mean annual temperature is a simple measure of the climatic conditions to which man is exposed. It is the mean of the daily high and low temperatures for a year, and does not critically reflect differences in daytime and nighttime temperatures. •

During most of their tooth-forming years children are active almost exclusively during daytime hours. Consideration of mean temperature alone may therefore result in an underestimation of the actual temperatures to which they have been exposed in warm, semi-arid climates. Comparisons of temperature ranges may reflect more clearly the real difference in temperature experienced by the chil-

dren residing in two geographic locations. The data on mean maximum and mean minimum temperatures and the temperature ranges for the Arizona communities under consideration, and for the midwestern communities (or representative communities if complete weather data for each city were not available) are also presented in table 6.

Although the difference between the mean annual temperatures of the two groups of communities is considerable, the difference in the range of high and low temperatures, or day and night temperatures, is even more marked. The midwestern communities have an average range of 22° F. between the daytime maximum and the nighttime minimum, whereas the Arizona communities have an average range of 33° F. Daily variations are considerably greater in any semiarid area (17), and daytime temperatures well above 100° F. are common

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Developing Trends and Standards of Sound Drug Therapy

—A Symposium of the AAAS—

The role of the United States Pharmacopeia, the National Formulary, New and Nonofficial Remedies, and Accepted Dental Remedies in developing and maintaining sound drug therapy trends and standards was the subject of a symposium at the annual session of the American Association for the Advancement of Science in St. Louis, December 1952.

The symposium, at which spokesmen for the four met to discuss this topic for the first time, was held at the joint session of the Association's subsection on pharmacy and its scientific section with the American Pharmaceutical Association, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Mr. Linwood F. Tice, dean of the Philadelphia College of Pharmacy and Science, presided. Dr. Lloyd C. Miller represented the United States Pharmacopeia, Dr. Justin L. Powers, the National Formulary, Dr. R. T. Stormont, New and Nonofficial Remedies, and Dr. J. Roy Doty, Accepted Dental Remedies.

By a special arrangement with the Association and the American Journal of Pharmacy, Public Health Reports is presenting somewhat condensed versions of the five symposium papers. Comments on the symposium made by Mr. Louis C. Zopf, representing the schools of pharmacy, are also included.



Standing (left to right): Mr. Linwood F. Tice and Dr. Lloyd C. Miller. Seated: Dr. Justin L. Powers, Dr. Robert T. Stormont, Dr. J. Roy Doty, and Mr. Louis C. Zopf.

A Public Responsibility

By LINWOOD F. TICE, Ph.G., M.S.

Pharmacists and physicians in the United States often overlook the unusual but fortunate situation which we enjoy concerning the establishment of drug standards. In most countries, a pharmacopeial commission is selected and

Mr. Tice, professor of pharmacy and dean of the Philadelphia College of Pharmacy and Science, acted as panel moderator. Mr. Tice is also a member of the revision committee of the United States Pharmacopeia.

empowered by the government to choose drugs warranting official recognition and to establish their standards for purity and strength.

In this country, a group of experts, the Committee of Revision of the United States Pharmacopeia, are selected by and from those physicians, pharmacists, chemists, and pharmacologists who represent all organizations having a recognized interest in drug standards. These experts are elected by a democratic process at each Decennial Convention of the United States Pharmacopeia. They, then, serve until their successors are elected at the next convention.

The National Formulary Committee, likewise, is composed of experts selected by the American Pharmaceutical Association without political or governmental interference.

The Congress has recognized the finished work of these two groups—the United States Pharmacopeia and the National Formulary—as establishing the legal standards for drugs in the United States. Supplementing these two books of legal standards are New and Non-official Remedies and Accepted Dental Remedies. The former represents those drugs meeting the qualifications as to nature, use, claims, and so forth imposed by the Council on Pharmacy and Chemistry of the American Medical Association. Accepted Dental Remedies lists those meeting the requirements of the Council on Dental Therapeutics of the American Dental Association.

These four books, U.S.P., N.F., N.N.R., and A.D.R., are true examples of democracy in action and ones of which we, as a free people, can rightfully be proud.

As in all democratic institutions, however, freedom imposes with it a responsibility, and those who help establish policy and guide the affairs of these books must keep this great public responsibility constantly in mind. Each of the five symposium members is intimately concerned with one of these official or standard books and the policy and program governing them. Each is, in fact, a key individual concerned in each instance. That each one has recognized his responsibility not only to the public but to the professions concerned in this work is evidenced by his presence at the symposium.

The United States Pharmacopeia

By LLOYD C. MILLER, Ph.D.

Specifying standards of quality and purity for drugs, the United States Pharmacopeia is published every 5 years by a permanent organization which was first created in 1820. The organization consists of a board of trustees, a panel of officers, a permanent secretariat, and a revision committee of 60 experts.

Members of the revision committee are selected for their knowledge of all branches of medicine, chemistry, and pharmacy which conceivably can contribute in an important way to the technical work of revising the list of drugs included in the Pharmacopeia and their standards. The work of the committee is organized and directed from permanent headquarters in New York City.

The revision committee consists of 20 experts in medicine and 40 experts from the pharmaceutical and allied professions. The primary responsibility of the 20 physicians is to determine what drugs represent the best practice and teaching of medicine. It is the responsibility of the 40 other committee members to determine how pure and potent these drugs shall be and to provide methods by which these qualities may be determined.

Of course, the specifications vary according to the nature and end use of the drug. A crude drug used as the starting material of a pharmacopeial item is far different from a drug intended for intravenous administration.

The Pharmacopeia must concern itself not only with the quality of the drug but with its packaging and storage so that its initial quality will not be modified. This concern extends, of course, to the nature of the containers and the length of time the drug is safe for use if it is subject to deterioration.

The Pharmacopeia has other ancillary functions, but its main purposes are to determine

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what drugs shall be given pharmacopeial status and how pure must these drugs be.

U.S.P. Function

How much does the United States Pharmacopeia influence drug therapy trends now?— is a question which defies answering in definite terms. An answer is important in determining whether the Pharmacopeia is doing enough or might do more. This question has never been made the subject of an opinion poll, nor is it likely to be, but a fairly sound estimate is possible by looking closely at these accepted facts:

1. The official (United States Pharmacopeia and National Formulary) drugs are emphasized in teaching students of medicine and students of pharmacy. Their familiarity with the official drugs is bound to increase the use of U.S.P. drugs. Conversely, drugs which do not have official listing are less favored because they are less well known.

2. The official drugs are of a standard quality which is not subject to unannounced changes dictated by whim or trivial considerations. Only after careful study and often extensive investigation in the laboratory are revisions in the U.S.P. standards made.

3. Within limits imposed by the patient's need, the official drugs are the agents of choice in those cases covered by such health insurance plans as the Blue Cross. Many health insurance contracts call for payment only for the official drugs. In some ways, this represents a handicap imposed for convenience, but it gives the United States Pharmacopeia a real responsibility. The branches of the Government which procure drugs in quantity—the Armed Forces, the Public Health Service, and the Veterans Administration—all draw heavily upon the United States Pharmacopeia.

4. The official drugs are generally less expensive than the nonofficial drugs because most of their research and development costs have been charged off over the years since their introduction. Relatively few of them are subject to patent control so that all the forces of competition are brought to bear on keeping down the cost of manufacture and distribution.

5. Under the new Food, Drug, and Cosmetic Act of 1938 as well as under the original act of

1906, the Congress directs the Food and Drug Administration to utilize the United States Pharmacopeia and the National Formulary to insure quality, purity, and potency of drugs moving in interstate commerce. In consequence, most of the individual States similarly direct their boards of pharmacy to use the official compendiums as the basis of their regulatory activities. It is an outgrowth of this adoption of the United States Pharmacopeia and the National Formulary that led to a serious complication. It arises from the fact that in many States the official drugs may be sold only under the direction of a qualified pharmacist. Strong forces are working to extend the marketing outlets of many well-established drugs so that they may be sold, for example, in grocery stores. Since obviously few grocery stores are interested in employing a pharmacist, there is much pressure to modify existing "restrictive sales" provisions. Although the United States Pharmacopeia takes no sides in this controversy, the backwash from it lapped at the very foundation of the authority on which rests the whole pharmacopeial program in this country.

Wisconsin Decision

A case arose which has been passed upon by the Supreme Court of Wisconsin since the date of this symposium. The validity of the Wisconsin State Pharmacy Act was challenged on the grounds that its dependence upon the United States Pharmacopeia constitutes delegation of legislative authority to a body not responsible to the Wisconsin State Legislature. In ruling against this challenge, the court quoted an 1873 Pennsylvania decision as follows:

"... the true distinction . . . is this: The legislature cannot delegate its power to make a law; but it can make a law to delegate a power to determine some fact or state of things upon which the law makes, or intends to make, its own action depend. To deny this would be to stop the wheels of government. There are many things upon which wise and useful legislation must depend, which cannot be known to the law-making power and must, therefore, be a subject of inquiry and determination outside of the halls of legislation."

Another section of the act declares that a drug shall be deemed misbranded if it purports to be a drug recognized by name in an official compendium unless it is packaged and labeled as prescribed therein.

Basis of Admissions

Admissions of drugs to the National Formulary are based upon their therapeutic value, the extent of their use, or both. When therapeutic value is a consideration, admissions to the 10th edition of the National Formulary will be based on the advice and recommendations of a special committee of medical consultants.

Where extent of use is the principal criterion for admission, it is determined by a consideration of trends in drug therapy, by information obtained from prescription ingredients, by extent-of-use surveys conducted by the National Formulary and others, and by a study of drug market reports.

Prescription surveys which report results only in terms of types of drugs used in compounding and dispensing are of little significance to the Committee on National Formulary of the American Pharmaceutical Association in determining extent of use. These surveys usually report that a large percentage of the prescriptions studied are for "specialties," a small percentage are for U.S.P. drugs, and a still smaller percentage are for N.F. drugs. These reports have the added disadvantage of creating an incorrect impression about the role of the official compendiums in developing and maintaining sound standards for drugs.

Of greater service are surveys such as that by J. S. Mordell, in which the incidences of occurrence of drugs in prescriptions are recorded in terms of official names in addition to the restricted names. We all know that many official drugs are distributed under one or more trade-mark names, but they are still official drugs because in their labeling they purport to be items whose names and standards appear in the official compendiums. We sometimes forget that an official drug by any other name than an official name is still an official drug and must comply with official standards. We are finding the information in Mordell's comprehensive study useful in deciding on deletions from the ninth edition of the National Formulary.

In contrast to the basis of admissions to the National Formulary, the United States Pharmacopeia has followed a more conservative policy. In general, its scope has always been restricted to drugs selected by representatives of the medical profession and believed by them to possess the greatest therapeutic merit. Extensive duplication of drugs having essentially the same action in any single therapeutic classification has been avoided as far as feasible. This selectivity has prevented the inclusion of many drugs of therapeutic value or extensive use, or both, and is responsible for the origin and development of the National Formulary.

Two Valuable Services

The National Formulary performs a unique service by providing official standards for extensively used and therapeutically effective drugs not covered by the Pharmacopeia. It may establish specifications for widely used drugs such as rutin or vitamin E concerning the utility of which medical opinion is divided. It provides for the continuance of official standards for drugs deleted from the United States Pharmacopeia during periodic revisions. Many of these drugs continue to be used extensively for many years after losing their Pharmacopeial status. We believe the ultimate consumer is entitled to assurance of the integrity of drugs in these categories through the protection offered by official standards. During periods of shortages of critical materials used in the manufacture of dosage forms, as when glycerin was scarce during World War II, the National Formulary has been instrumental in developing official specifications for safe and satisfactory replacements.

The National Formulary also performs a distinct service to pharmacists and pharmaceutical manufacturers by providing specifications for the procurement of drugs used in dispensing, prescription-compounding, and manufacturing, and in formulas and working directions for the preparation of dosage forms.

We are conscious that the official compendiums ought to be made more useful to the practicing pharmacist. I believe this can be accomplished best by furnishing certain background information which he can use in his everyday practice. Plans have been formu-

lated for doing this in subsequent revisions of the National Formulary by the device of an appendix, the content of which cannot be construed as constituting official standards.

New and Nonofficial Remedies

By R. T. STORMONT, M.D.

The Council on Pharmacy and Chemistry of the American Medical Association was organized in 1905 to serve the medical profession by providing authoritative information about therapeutic agents.

At first the council was primarily concerned with the problem of exposing quackery in the field of therapeutics. Secret remedies, promoted under false or grossly exaggerated claims, provided a major target of attack. After the enactment of laws providing for more stringent regulatory control over drugs, the council tended to devote its efforts more toward the encouragement of a constructive program of rational therapeutics. This is reflected by the fact that the annual publication, *New and Nonofficial Remedies*, is generally regarded as the major contribution of the council toward advancing the science, if not the art, of medicine.

What is the exact nature of the information contained in *New and Nonofficial Remedies*? At present the book consists of two major divisions. The first section deals with general statements on broad classifications of preparations and monographs describing the actions, usage, and dosage of specific council-accepted drugs. The second section contains physical descriptions, tests for identity and purity, and methods of assay for the active ingredients and dosage forms of those council-accepted drugs for which official standards are not yet available. Thus, the importance of *New and Non-*

official Remedies in developing and maintaining sound drug therapy trends would appear to be self-evident. However, there are certain points which deserve some emphasis.

Physician's Guide

Nomenclature of drugs is a rather important, though admittedly somewhat tedious, matter. The council always desires to cooperate with pharmaceutical manufacturers in the selection of generic or nonproprietary names for new drugs. The council encourages manufacturers to submit proposed generic and trade names for new products even before they are ready for the market. The early adoption of nonprotected designations for medicinal agents tends to obviate a certain amount of needless confusion in the literature. Usually such names are subsequently adopted by the United States Pharmacopeia and the National Formulary.

A drug which is accepted for inclusion in *New and Nonofficial Remedies* must be marketed and promoted in conformity with the rules of the council. The advertising and labeling must not contain claims unacceptable to the council. It is the responsibility of the drug manufacturer to submit the evidence necessary to convince the council that any proposed claims are justified.

The average physician today does not have the time or facilities to evaluate new drugs himself and to determine their proper indications for use, contraindications, limitations, and hazards. Not infrequently he finds it most difficult to study authoritative reports of the developments in therapy which are published in medical journals. He may or may not obtain reliable and useful information from a drug detail man or from promotional copy. Under these circumstances *New and Nonofficial Remedies* serves as a most useful reference volume or guide for rational therapeutics.

Some drug manufacturers and physicians have wondered why relatively few mixtures have been accepted for inclusion in *New and Nonofficial Remedies*. Obviously, it is the right and duty of a physician to know the essential composition of the drugs he prescribes. He also wishes to know if the mixtures are unnecessarily complex. He must be mindful of the fallacy of routinely prescribing unnecessarily

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potent agents and of prescribing several drugs of different actions in fixed proportions in one preparation. More often than not he has to adjust the dose of a worthwhile drug to fit the therapeutic needs of the patient. The council believes that any drug should be administered according to the specific needs of the patient. Thus, a mixture containing phenobarbital and atropine in fixed proportion frequently does not serve the best interests of the patient inasmuch as he is apt to be either overdosed or underdosed with one of the active constituents.

Occasionally physicians are somewhat puzzled when an admittedly useful drug which has been on the market for a number of years does not appear in New and Nonofficial Remedies. The usual explanation is that the manufacturer has simply neglected to submit the drug to the council for acceptance. This seeming deficiency is becoming less important as firms become increasingly aware of the need and desirability of securing council acceptance for their most worthwhile products.

Modified Scope

In what respects is New and Nonofficial Remedies subject to criticism and how may it be improved? Inasmuch as the primary objective of this publication is to provide authoritative information on relatively new drugs, monographs on morphine, atropine, and the like are conspicuous by their absence. Nevertheless, it must be recognized that many old and well-known medicinal agents still have a most necessary and valuable place in our therapeutic armamentarium. An attempt will be made in future editions of New and Nonofficial Remedies to present more adequately the comparative virtues of the old and well-established official drugs in relation to the newly introduced agents. Thus, the physician should be better aided in making his choice of medication for a particular disease condition. That is one way in which New and Nonofficial Remedies can be improved and made more useful for both the physician and medical student.

Even though New and Nonofficial Remedies is revised annually, it is impossible to keep the book up to date on all developments in modern therapeutics. New drugs are being introduced with ever-increasing rapidity. One must ad-

mit that New and Nonofficial Remedies, like many other scientific treatises, is out of date in some respects immediately after publication. Nevertheless, it continues to serve a most useful purpose. Sometime in the future it may be necessary to publish New and Nonofficial Remedies at more frequent intervals. At present, however, it would appear that publication at yearly intervals should serve the needs of the physician and the medical student who also continue to study the current authoritative medical journals.

The major change in the 1953 edition, which is now in the process of revision, essentially will involve separate publication of the two major divisions of the present volume. The reason for this seemingly radical modification should be quite obvious. Physicians, medical students, and pharmacists have little or no interest in the technical detail covered in tests and standards for drugs. They depend upon manufacturers and legal regulatory agencies to insure the purity and potency of medicinal agents. It is believed that divorcing the section on tests and standards from New and Nonofficial Remedies will make the book more acceptable to the great majority of individuals who rely upon it as an authoritative guide for sound therapy.

Accepted Dental Remedies

By J. ROY DOTY, Ph.D.

It has been noted that the United States Pharmacopeia and the National Formulary at the present time primarily provide standards of identity and composition which have official recognition in the Food, Drug, and Cosmetic Act. Accepted Dental Remedies is more nearly like New and Nonofficial Remedies in that each is primarily a handbook of therapeutics and is concerned only secondarily with standards of composition. The two latter books are also similar in other respects. Both are official publications of agencies of professional associa-

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tions; both provide informative monographs as well as a listing of commercial products. There is also a considerable degree of similarity in the methods which are employed to determine eligibility of products for listing in New and Nonofficial Remedies and Accepted Dental Remedies. The rules of the Council on Pharmacy and Chemistry of the American Medical Association and the provisions for acceptance of products by the Council on Dental Therapeutics of the American Dental Association both emphasize the importance of suitable names, proper labeling and advertising, and the requirement of adequate evidence for the usefulness of commercial products. Each book is revised annually to provide information of current value. For each, the conclusions of the respective councils are based upon currently available information and are subject to modification at any time that a substantial amount of new evidence becomes available.

On the other hand, there are certain dissimilarities. In New and Nonofficial Remedies, the emphasis is on newness of products, whereas Accepted Dental Remedies places considerably more emphasis upon completeness of listing of drugs useful to dentists. This is possible and appears desirable in view of the fact that the number of drugs which are useful in the practice of dentistry is considerably smaller than the number which are useful in the practice of medicine. Accepted Dental Remedies even carries some informative monographs on obsolete preparations so that the dental profession may be informed concerning products described in earlier literature. However, in these instances it is clearly indicated that the listing is intended simply to provide information and that there are no products accepted in these categories.

Further differences in the books are explainable in the differences of their intended use. Since the method of use of a particular drug by a dentist may differ from its use by a physician, it does not always follow that a drug which is suitable for inclusion in New and Nonofficial Remedies will necessarily be suitable for listing in Accepted Dental Remedies.

I would like to suggest that each of the four compendiums considered in this panel discussion serves its own particular purpose and tends

to supplement the value of the others. Certainly the size and complexity of Accepted Dental Remedies would be greatly increased if official standards of composition were not available in the Pharmacopeia and the Formulary. Although the usefulness of the latter two publications might be somewhat enhanced by the suggestions presented, it is my belief that the interests of the various professions and the public will be best served by continuing their emphasis primarily on standards related to nomenclature and composition, while New and Nonofficial Remedies and Accepted Dental Remedies continue their primary emphasis on therapeutic actions and uses.

Comments on the Symposium

By LOUIS C. ZOPF, M. S.

It is generally conceded that any group of standards becomes of increasing value directly as their usefulness becomes apparent. I can subscribe to the statements which have been made in this symposium and would like to encourage the suggestions of Dr. Lloyd C. Miller and Dr. Justin L. Powers that the two official compendiums, the United States Pharmacopeia and the National Formulary, are definitely considering expanding their usefulness to the medical profession.

It is most gratifying to learn that the American Medical Association is contemplating a change in the format of New and Nonofficial Remedies by consolidating all drug standards in one section and the pharmacologic, therapeutic information in a second section.

Physicians have learned to respect the United States Pharmacopeia and the National Formulary and have also learned to understand that they are generally referred to by the abbreviations "U. S. P." and "N. F." Their understanding of these two books, however, seems to exist only as a regard for the standards for the substances listed therein and not for the knowl-

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edge of the contents. They are certain that these books represent the highest standards of therapeutic requirements and are representative of considered judgment, clinical evaluation, and therapeutic merit.

It is not uncommon for a medical colleague to inquire of the pharmacist what *his* Pharmacopeia says about a specific product. The physician, while interested in the chemical and physical properties of a medicament, is primarily interested in its therapeutic use. For this reason, many of our medical colleagues find it convenient to use proprietary preparations. Commercial pharmaceutical organizations provide the physician with adequate literature to substantiate the validity of the therapeutic merits of their products.

Publicity alone is not sufficient. If we expect the medical profession to utilize the pharmacopial drugs, we should do everything possible to assist them in the methods and possibilities of their use and application of such agents.

Textbook type of information is not what is generally desired but rather concise information relative to the therapeutic possibility of the drug, its tolerance, toxicity and its incompatibilities and contraindication if such exist. Dosage, of course, is essential but this is now supplied in both the National Formulary and the United States Pharmacopeia. If the item is an official vehicle, then that vehicle should be described as to its flexibility and ramifications of usefulness.

For example, it would be well to inform the physician about the amount of water which Hydrophilic Petrolatum will absorb; the possibility of adding water to Hydrophilic Ointment to make it available in lotion form; the many features of Polyethylene Glycol Ointment including its ready removal from the skin, its nonoleaginous nature; and the question of concentrations of medicament when used in these vehicles.

New Directions for Research in Infant Care

Further research to establish the general relationships between infant mortality and such factors as income level and occupation is probably needless, according to Dr. Odin W. Anderson, research director of the Health Information Foundation, New York City (*The Child*, April 1953 issue). A direct and undiminished correlation between a high standard of living and low infant mortality is assumed. Where infant mortality rates go higher than 30 per 1,000 live births, an improvement in the standard of living will have a long-range effect, as it has since 1890 in various countries. But when the infant mortality rate drops to about 30, the broad economic and social factors operate with lessening effect. Then an increasing influence on the rate begins to be exercised by personal factors in the care of the baby, like adequacy of mothering and readiness—and ability—to use proved methods of infant care. Given the essentials of living, use of a bottle sterilizer can have a greater effect in some families on saving babies' lives than a \$500 annual increase in income.

Infant mortality is often referred to as a sensitive index level. Where the health level is low, whether in wartime or peacetime, the infant mortality is high accordingly. Rates vary widely between countries, between areas within coun-

tries, and even between residential areas within cities. Obviously, factors other than general economic ones account for the low infant mortality rates among the foreign-born Jewish group studied in an early analysis (1911 to 1916) of infant mortality in eight cities in the United States. The Jewish group experienced the lowest infant mortality rate of all groups studied—54—and the lowest neonatal mortality rate—28. Closer examination would probably reveal a pattern of infant care of a high order embedded in the Jewish culture.

Dr. Anderson believes that other than purely medical research, further exploration could well be made of the illness of babies in relation to socioeconomic factors. Another subject for investigation, he suggests, is the effect of adverse socioeconomic conditions on the unborn baby and on the ability of the mother to bear a full-term healthy baby. Two of the many questions still unanswered concerning the relationship of socioeconomic and ethnic factors to infant deaths are, he writes: What are the environmental conditions in localities where infant mortality is still extra high by modern standards? How do traditional ways of caring for infants in various ethnic groups affect the survival of infants in these groups?

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Survey of Consultant Nurses In Health Agencies

By PEARL McIVER, R.N., M.A.

AT THE REQUEST of the Council of State Nursing Directors at their meeting in California in October 1951, a limited, exploratory survey of consultant nurses employed by State and local health agencies was begun by the Public Health Service. The survey was proposed to aid State health departments in planning for nurses' participation in the many new health programs, such as chronic disease, occupational health, and mental health, and as a guide to universities which offer courses in the specialties designed to prepare consultant nurses.

Source of Data

The data were obtained from 48 State and Territorial health departments and consisted of an individual personnel history and a job description on each consultant nurse on duty January 1, 1952, in a State or local health agency. Records were received on almost 500 nurses but not all were used. Some were for personnel whose primary responsibilities were administrative rather than consultative and were therefore not included in this survey. Of the 458 consultants for whom records were received, 315 were employed by State health departments, 65 by other State agencies, and 78 by local health agencies.

The personnel histories were accurate and fairly complete for general academic education

and university preparation in public health nursing, but they were sometimes incomplete with regard to nursing experience and preparation in the specialties. Some of the job descriptions were clear and comprehensive, but many were either too general or contained too much detail. Therefore, no attempt was made to give definite numerical ratings to functions or responsibilities of the nurses.

A progress report was given to the State nursing directors who attended the American Public Health Association meeting in Cleveland in October 1952. At that meeting, the State nursing directors agreed to send to the Public Health Service author supplementary data on the amount and kind of training in a specialty for consultant nurses who were serving State agencies. By January 14, supplementary data had been received from 42 States and were added to the previous material.

After the preliminary tabulations were completed the data were given to groups of special nursing consultants in the Public Health Service and in the Children's Bureau for review and comment. The data contained so much information of interest to the Federal consultants that each group agreed to prepare a detailed report on their respective specialties. This report, however, summarizes only the general information obtained from the survey.

Responsibilities of Nursing Consultants

Primarily, a consultant nurse is an adviser to and a teacher of other nurses. Unlike a supervisor, she does not have administrative responsibility for the nurses she is helping. She

Miss McIver is chief of the Division of Public Health Nursing, Public Health Service. The material in this article was prepared by the division's staff.

gives consultation in her special field to official and voluntary health agency personnel. She also interprets the program in her specialty to the general public. Her success depends upon the needs for her special knowledge and skills, her ability to create a desire for her services where the needs exist, and her ability to fill these needs.

Consultation is a two-way channel. The consultant learns from the nurses, health officials, and general citizens what the needs are and how well the proposed plans meet those needs. The consultee benefits from the broader knowledge and experience which the consultant brings to a discussion of a common problem.

From the job descriptions submitted, the functions and responsibilities of consultants were grouped into 8 categories, of which 5 could be classified as common functions in any consultation program. These five were: education, studies and surveys to determine needs and resources, policy formation and program planning, interpretation of policies and plans, and evaluation of special programs. Most of the consultants also had some responsibilities in one or more of the other three: administration, supervision, and provision of direct services. Some were participating in the administration of a special program, some were giving direct supervision to local nurses where no local supervision was provided, and a few were providing direct services in a specialty to areas of a State where there were no organized health services.

Types of Consultants

Of the 315 consultant nurses in State health departments, 291 devoted full time to one field, and 24 served in more than one specialty or added consultation in a specialty to their general responsibilities. Only in the chronic diseases was one consultant responsible for more than two programs, and since the total number of consultants in this category (heart, cancer, geriatrics, diabetes) was small, the consultants in these fields have been grouped under the chronic disease category.

The 98 general public health nursing consultants outnumbered all other categories in State agencies. Only 18 of the 98 carried a specialty in addition to their general responsibilities. Four combined tuberculosis and gen-

eral consultation. Two were also venereal disease consultants; one was also director of field training. One gave consultation in industrial hygiene, and two in chronic disease, in addition to serving as general public health nursing consultants. Seven combined maternal and child health services and one combined crippled children's services, with general consultation.

Nursing consultants for crippled children services were the next largest group. Of 93 such consultants, 31 were employed full time by State health departments except for 1 who served part time as a general consultant. Fifty-four were full-time employees of other State agencies for crippled children. Eight were employed by local agencies.

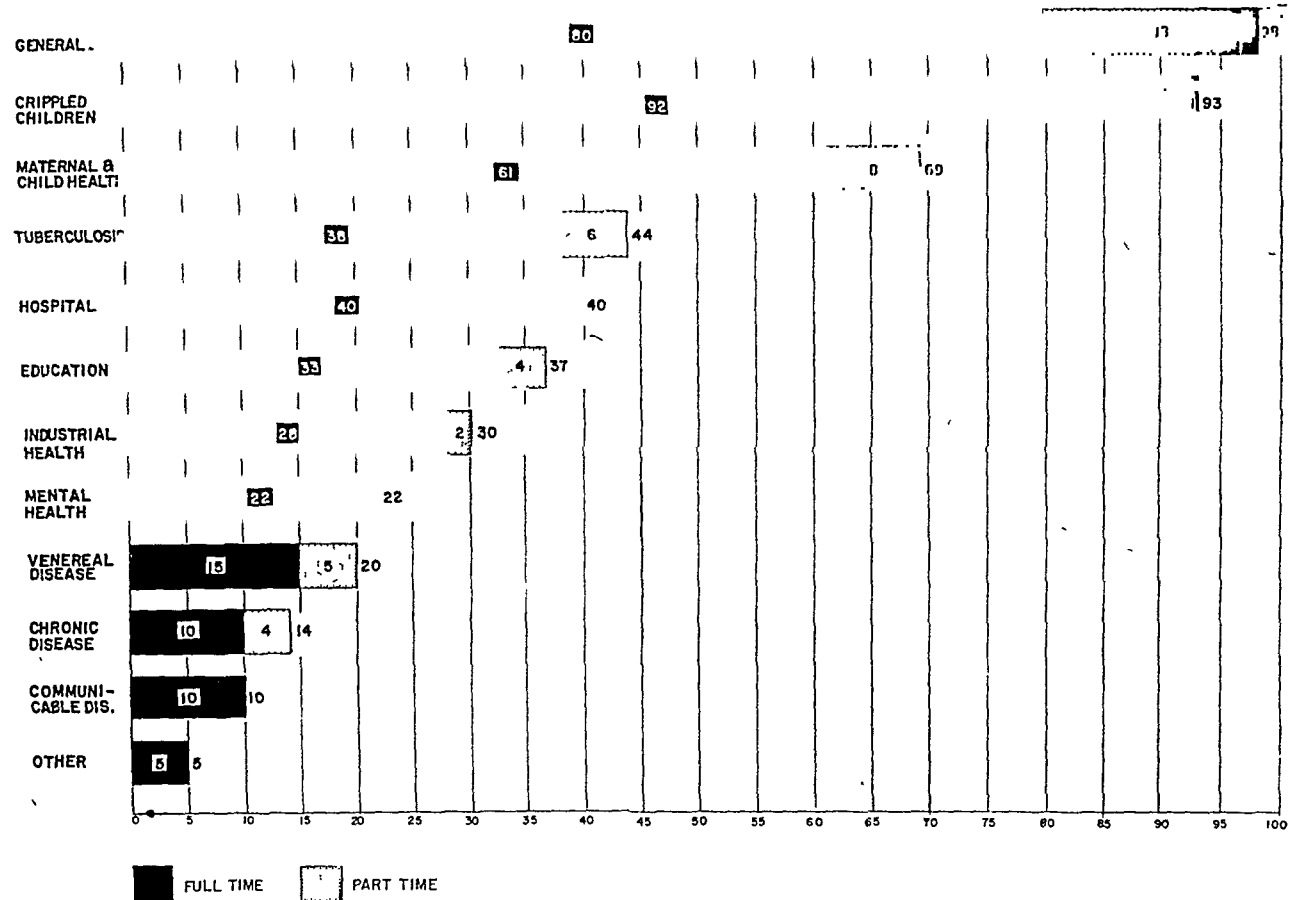
Of the 69 consultants in maternal and child health nursing, the third largest group of consultants, 53 were employed in State health departments. Forty-five in State health departments devoted full time to this field and 8 part time. The 8 carried additional responsibilities, 7 for general consultation and 1 for educational work. Sixteen were in local agencies.

Tuberculosis nursing consultants were the next largest group. Of the 44 in this specialty, 34 were employed by State health departments; 28 full time. Four served part time in the general field, 1 spent part time on venereal disease consultation, and another spent part time on the chronic disease program. Five were employed by other State agencies and 5 by local health agencies.

Hospital nursing consultants are among the newest type. A total of 40 were reported; 23 general hospital or nursing consultants on full-time duty in State health departments. There were 12 maternal and child health hospital nursing consultants in State health departments. Five hospital nursing consultants were employed full time in local health agencies.

Educational consultants were employed by 37 agencies. In State health departments, 17 served full time and 4 part time. The 4 divided their time, 1 each with general, venereal disease, industrial, and maternal and child health consultation. Educational consultants (or educational directors) made up one of the largest groups (16) in the local agencies.

Figure 1. Distribution of full-time and part-time nursing consultants in State and local health agencies by type of program on January 1, 1952. (Twenty-four consultants served part time in 48 programs.)



Of the 24 industrial nursing consultants employed by State health departments, 22 were full time. One spent part time as educational director and another carried a district for general consultation. Only one industrial consultant nurse was reported from other State agencies although previous reports indicate that there are additional industrial nursing consultants in State labor departments. Five were employed by local health agencies.

Mental health consultants ranked next with 22. Only eight worked full time in State health departments. Four were employed full time by other State agencies and 10 by local agencies.

Venereal disease nursing consultants were employed by 20 State and local agencies. Of the 15 in State health departments, 10 served full time. Two were also responsible for general consultation. One served part time in tuberculosis; one gave part of her time to

chronic disease, and one served as part-time educational consultant on field training activities. Local health agencies employed five full-time venereal disease consultants.

Chronic disease consultants compose a group of 14 nurses: 11 in State health departments, 1 in another State agency, and 2 in local agencies. Two were serving as full-time cancer nursing consultants in a State health department. In two States, cancer consultation was combined with cardiac control consultation, and in one State, cancer and general consultation were combined. In one local visiting nurse association, one nurse served in cancer control.

Two States reported full-time chronic disease nursing consultants. In one State chronic disease and general consultation were combined, and another State combined chronic disease with venereal disease control consultation. One State health department and one other

State agency supplied full-time nursing consultants on rheumatic fever, and in one State health department, tuberculosis and cardiac consultation were combined. One local health department had a full-time consultant on rehabilitation.

Communicable disease nursing consultants were a slightly smaller group. Five were serving in State health departments, and five in city health departments. All were full time.

Other nursing consultants were reported from 4 States and 1 city: 1 full-time consultant for civil defense, 1 for dental health, 1 on community organization, and 1 for vision and sight conservation. One nurse in a city health department served as a full-time consultant on records and statistics.

Figure 1 shows the distribution of nursing consultants in State and local health agencies, by type of program.

Functions of Consultants

Examination of position descriptions in terms of the eight categories of responsibilities previously cited not only indicates the scope of consultation but also reveals limitations and suggests points for further consideration.

Most of the functions of the consultants are educational. The groups to whom the educational programs were directed, in order of frequency, were State and local health personnel; nursing students, basic and graduate; hospital and other institutional workers; industrial nurses and their employers. In carrying out their responsibilities in this category, consultant nurses conducted institutes and work conferences, prepared manuals and guides, selected and distributed educational material on their specialties, demonstrated specific techniques and procedures, and oriented new personnel.

Practically every job description mentioned responsibility for studies and reports. A large number mentioned helping to plan and organize case-finding surveys for tuberculosis, diabetes, and venereal disease. A few mentioned studies of educational resources and surveys of treatment facilities in their specialties.

Only a few job descriptions mentioned participating in policy formation and in planning

the overall program in their specialties. If the consultant nurse is to make her maximum contribution to a disease control or health promotion program, she must be a member of the team having overall responsibility for that program.

If the consultant's office is in a different building, or even in a different section of the same building, will she have the opportunity to participate in informal conferences where many of the preliminary, as well as final plans are made? The job descriptions did not record policy formation and planning frequently. Does that mean that the directors of special programs minimized her contribution or that the nursing consultant believed such participation was unimportant?

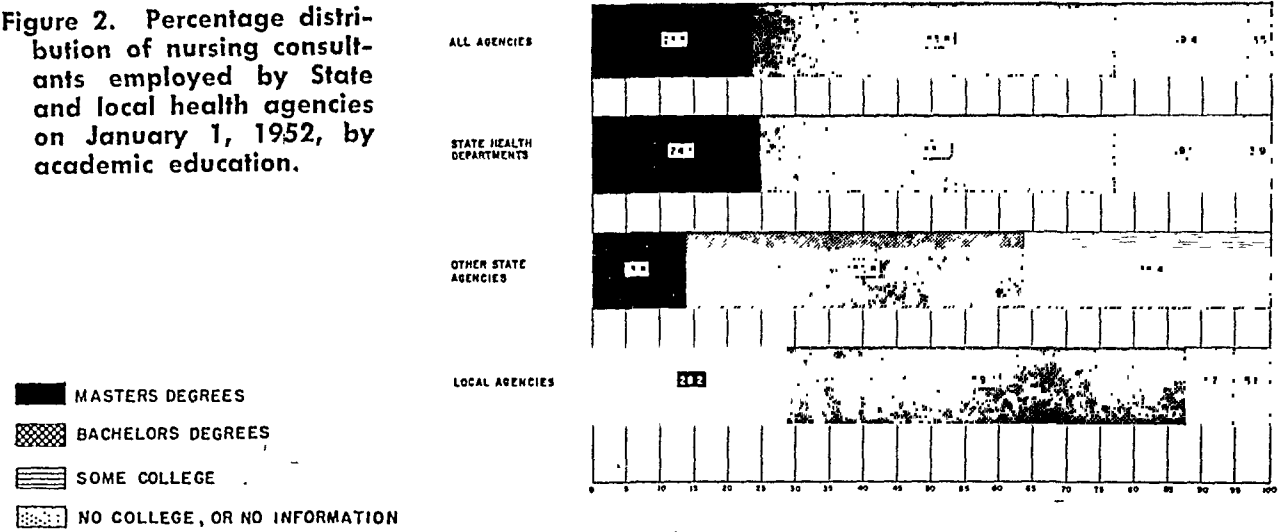
Many functions pertaining to interpreting policies and plans to local health agencies, other State agencies, and professional organizations were recorded. Since this was a frequent function of the consultant nurse, she should have a real contribution to make in the formulation and revision of policies and plans.

Only a few of the job descriptions recorded specific functions on evaluating the effectiveness of special programs and efficiency of nursing personnel functioning within the program. All of the special program divisions depend to a large extent upon the local general nursing staff to translate their programs into action in local areas. Is not one of the important purposes of a consultation program to help local health officers and nurses to measure the effectiveness of their special programs?

In most instances, consultants employed by State health departments recorded "direct service in local areas" less frequently than did the consultants employed by other State agencies. These data did not reveal why this was so, but it is logical to suggest that the State health department personnel are more familiar with local health department facilities and therefore refer special problems to the local personnel, while some other State agencies may not have as direct contact with local health agencies.

Administrative functions in connection with the special programs were recorded most frequently in those States where there was no full-time administrator of that special program or a very limited administrative staff. In one State a nurse is assistant administrator of the

Figure 2. Percentage distribution of nursing consultants employed by State and local health agencies on January 1, 1952, by academic education.



maternal and child health program. No doubt she gives some nursing consultation, but since administration was her primary responsibility, she was not included in this study. However, in another small State, the nursing consultant was the administrator of the mental hygiene program, and in one State the tuberculosis nursing consultant had the major responsibility for directing the tuberculosis control program.

Professional Preparation

Academic Education

Of the 458 consultants employed in State and local health agencies, 353, or 77.0 percent, had 1 or more college degrees. One hundred seven, or 23.3 percent, had master's degrees and 246, or 53.7 percent, had bachelor's degrees only. Eighty-nine, or 19.4 percent, had some college work and 16, or 3.4 percent, had no college work or no information was submitted on this item. The group of consultants employed in local health agencies showed the highest percentage (87.2) with degrees. State health department consultants ranked second with a percentage of 77.1 percent and the lowest percentage (64.6) was shown by the group serving in other State agencies (fig. 2).

Public Health Nursing

A program of study in public health nursing is an accepted requirement for nursing consultants in the field of public health. Four hundred and eighteen (exclusive of 40 hospital

nursing consultants) served in public health programs. Of these, 360, 86.1 percent, had completed a program of study in public health nursing; 20, 4.8 percent, had had some public health nursing study; and 38, 9.1 percent, had had none or submitted no information on this item. The consultants in local health agencies ranked highest among those who had completed a program of study in public health nursing, with a percentage of 90.4. The State health department consultants showed a percentage of 88.9 and those in other State agencies a percentage of 69.2 (fig. 3 and table).

Not every record gave information on the length of present employment. From the records, it appeared that those consultants without university preparation in public health nursing had been in their positions for a number of years.

Although a program of study in public health nursing is not considered a requirement for hospital nursing consultants, it was found that 17 of the 40 hospital consultants were so qualified. About one-third of the hospital nursing consultants reported some university preparation in their specialty.

Postgraduate Education in the Specialty

Postgraduate education in the specialty is generally thought of as one of the requirements for a consultant serving in a specialty. There has been a rapid expansion of specialties in public health programs within recent years and a

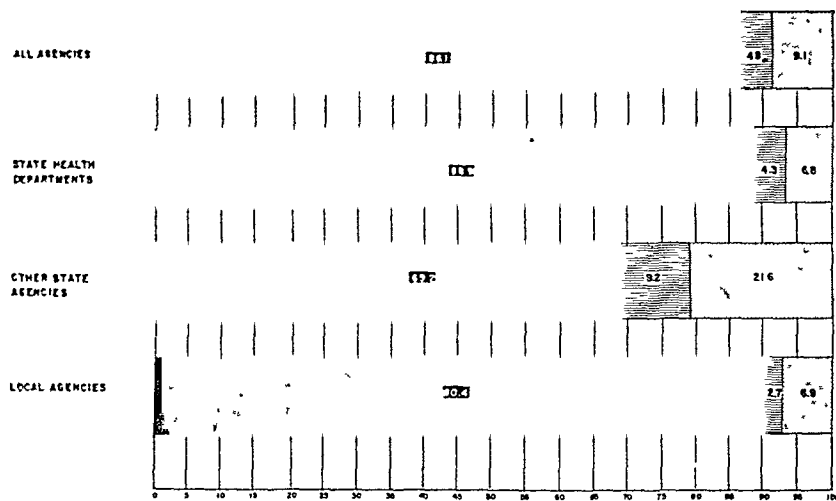


Figure 3. Percentage distribution of nursing consultants, exclusive of hospital nursing consultants, on January 1, 1952, by public health nursing education.

concomitant growth in the number of specialized nursing consultants employed. There is no clearly defined program of study for some of the categories of consultants represented in this report. The questions of what constitutes educational preparation in a specialty and what categories should be considered as specialties appear to need further exploration and study.

A sampling of data submitted on 139 consultants in State health departments (exclusive of the 80 general consultants and 96 consultants engaged in maternal and child health and programs for crippled children) revealed that 105 or slightly more than three-fourths of them had had some postgraduate education in their specialty, varying from institutes of 1 week's duration to 18 months of formal study. In view of the limitations of the data no attempt is made to show this type of education

in over-all table form. The detailed report of each specialty will include a discussion of postgraduate education in the respective fields.

Experience

When information concerning previous experience was not recorded, it was coded on the punch card as "none." Quite frequently the reviewers were reasonably certain that the answer was "no experience reported" rather than "none." However, it was not possible to separate those who failed to record experience from those who had no previous experience. Therefore, this report gives only a general picture of the background experience of the consultants.

The specialties in which the largest majority of the consultants recorded previous experience in general public health nursing supervision were venereal disease, tuberculosis, and mater-

Public health nursing education of nursing consultants employed in State and local health agencies exclusive of hospital nursing consultants, as of January 1, 1952

Type of agency	Total consultants		Amount of public health nursing education					
			Completed program of study		Some public health nursing study		None or no information	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All agencies.....	418	100	360	86.1	20	4.8	38	9.1
State health departments.....	280	100	249	88.9	12	4.3	19	6.8
Other State agencies.....	65	100	45	69.2	6	9.2	14	21.6
Local agencies.....	73	100	66	90.4	2	2.7	5	6.9

nal and child health. Consultants in mental health, crippled children, and education ranked next highest insofar as previous public health nursing experience was concerned. About one-third of the general and industrial nursing consultants either had no previous public health experience or failed to record their past experiences.

Experience in public health nursing is a specified requirement in announcements of qualifications for appointment to any consultant position in the field of public health nursing. Many of the examination announcements specify experience in general public health nursing, and in addition, require experience as a public health nursing supervisor prior to appointment to a consultant position. Some of the States have required public health nursing experience of those nurses who were appointed as hospital nursing consultants. Desirable as it may be to have every nurse prepared for first level work in public health nursing, it would appear that, for hospital nursing consultants, experience as a hospital nursing supervisor or administrator is more important than experience as a public health nursing supervisor if only one type of experience is required.

About one-third of the hospital nursing consultants recorded public health nursing experience prior to their present assignments. All of those who had not had public health nursing experience reported experience in clinical supervision, teaching, or administration of nursing services. Two of the hospital nursing consultants with previous public health nursing experience had had no experience in clinical nursing.

Clinical experience in the specialty was reported most frequently by the public health nursing consultant in maternity and child health. About 30 percent of the industrial nursing consultants reported experience within industry which might be likened to clinical experience in the other specialties. Less than 10 percent of the consultants in the other specialties reported previous clinical experience in their specialty.

Discussion

Many of the job descriptions did not define clearly the responsibilities of the position. The

nursing service would be strengthened if these descriptions were more comprehensive. An accurate description of the duties and responsibilities of a position, kept up to date at least biennially in accordance with changes in program emphases, would help and guide a new appointee to the position.

A number of the personnel histories submitted for this study apparently were prepared years ago and from those records it would appear that the present incumbent did not meet the professional requirements specified by the State merit system agency for that particular position. For one-third of the general public health nursing consultants, no public health experience prior to that obtained in the present position was recorded. Personal acquaintance with many of these nurses convinces the reviewers that no information was given rather than the inference that so many of the general consultants had had no previous public health nursing experience.

The nursing consultants included in this study were well prepared academically for their responsibilities. Formal preparation for some of the specialties has not yet been well defined, but at least one university has experimented with, and this year is offering, a program in chronic disease and tuberculosis. What should the content include and how much time is required to prepare nursing consultants for such specialties?

A considerable number of the job descriptions specifically mentioned the consultants' responsibility in assisting basic schools of nursing with the integration of that specialty in the undergraduate curriculum. This is an encouraging development and indicates the health agencies' interest in and responsibility for participation in basic nursing education programs.

General hospital nursing consultation services in State health departments, for the most part, have been developed since the passage of the Hospital Survey and Construction Act. This consulting service was provided in 15 States on January 1, 1952.

In addition to the general hospital nursing services, it was encouraging to note the frequency with which the job descriptions of consultants in such specialties as tuberculosis, ma-

ternal and child health, cancer, and venereal disease listed as one of their functions "giving consultation to hospital and sanatorium personnel." Good patient care requires a close liaison among those persons responsible for care during the preventive and case-finding stages, the treatment period, and the recovery and rehabilitative stages.

A lack of experience or training in modern hospital procedures may have limited the number of consultants who gave service to hospitals and medical care institutions. Is clinical nursing an area that should be emphasized in in-service education programs for public health nursing consultants?

Comparatively few of the nursing consultants were designated as consultants for more than one specialty. Only 24 out of 458 were listed as specifically serving in more than one specialty. Of the 24, only 18 were general consultants with designated responsibility for a specialty also. Undoubtedly all of the 80 full-time general public health nursing consultants devoted considerable time to each of the specialties.

The newer programs, such as heart, cancer, and geriatrics, which we have tabulated as the chronic disease category, reported only 11 consultants with specific responsibility for one or a combination of specialties in State health departments. The trend in State health department organization appears to point to a combination of several disease control programs, grouped under a unit designated as the bureau of preventable diseases; or into one unit concerned with chronic or long-term illnesses; or another bureau concerned with epidemic or acute illnesses which have public health significance. It was hoped that this study would reveal a similar grouping of public health nursing combination services. The data do not reveal any significant number of combinations. Neither do these data reveal to what extent

the general consultants participated in the special programs.

Questions for Consideration

These data show that there has not been much experimentation with the idea of having one well-qualified nursing consultant to serve two or more related specialties. If all of the long-term health problems, such as heart, cancer, diabetes, geriatrics, and rehabilitation, were grouped under one bureau, could one nursing consultant serve them all if she were not required to render direct service locally in addition to her consultant functions? Could a combination of the acute communicable diseases, including venereal disease, be handled similarly by one nursing consultant skilled in epidemiological techniques and procedures? Would the educational consultants be more valuable teachers and leaders if they were skilled mental health consultant nurses since mental health should be an integral part of every health program?

Special consultation services should not be developed at the expense of adequate local nursing supervision or at the expense of the provision of high quality general public health nursing consultation which is essential to insure the coordination of all programs. There is a short age of qualified public health nursing administrators, supervisors, and consultants. How can the services of each be used most effectively?

A study made of personnel history records and job descriptions could furnish a wealth of information provided all of these records were accurate and complete. Even with the limitations of the 1952 data in this survey, the Federal nursing consultants found the data very useful. If an effort is made by each agency to improve these two sources of information, and a number of States try some new combinations during the next few years, would it be valuable to repeat a study of this type every 5 years?



Science and Public Health Research in Alaska

Alaska, one of today's "new frontiers," is witnessing an important growth in scientific undertakings. Not the least of these are investigations in public health and related fields of science. Reviewing development of the Public Health Service's Arctic Health Research Center at Anchorage, the late Dr. Joseph W. Mountin wrote:

"In the past, public health activities have developed in the wake of civilization. Now public health is presented with an opportunity to lead civilization, to pioneer in new fields. By uncovering some of the problems of human life and adjustment in low-temperature areas, public health can become a creative force in opening up new frontiers. At the same time it can make potentially significant contributions to basic knowledge."

Last September—4 years after the beginnings of the Arctic Health Research Center—the Third Alaskan Science Conference was held at Mt. McKinley National Park under the sponsorship of the American Association for the Advancement of Science's Alaska Division, which grew out of the first Alaskan Science Conference in Washington in 1950.

Conference topics in 1952 ranged from agriculture, forestry, and botany to zoology and wildlife, and from anthropology to sociology, economics, and education. *Public Health Reports* has selected 10 papers for reporting "in brief." These represent only a few of the many topics touching upon the difficulties of introducing modern technology and methods of living to an old civilization and primitive methods of living. With one exception, all the briefs deal with specific health topics.

The exception is a paper of Dr. Margaret Lantis on the role of science in general and social science in particular in a pioneer environment which lends itself as an ideal laboratory for scientific research. This discussion is presented in the form of two briefs.

Reader's Guide

Topic	Page
Science trend.....	528
Social sciences.....	529
Enteric diseases.....	531
Animal-borne diseases..	533
Hydatid disease.....	534
Canine distemper.....	535
Mosquito control.....	536
Mastoiditis.....	537
Water systems.....	538
Water pollution.....	539
Food study.....	541

The Trend of Science

PHR The scientist is a person who lives for and in the future. He is a dreamer with self-discipline. His objective is to state generalizations, principles, propositions, tendencies, and laws that are the bases for prediction.

The scientist must always stand the test of prediction, for prediction is an essential part of scientific method. Even though a paleontologist or archeologist is concerned with reconstruction of the past and does not expect to see trilobites or Mousterian man on earth again, he uses history to formulate principles of anatomic or cultural change. In other fields, the use of prediction is even more immediate.

But philosophers state principles, and everyone predicts. Any person functioning as a scientist is different, however, in his use of exact methods, in his willingness to reveal these methods to others without distortion, and in his integrity and impersonality in stating his observations. Thus, he is, or should be, always conscious of standing the test of the future. He constantly seeks new ideas, new methods.

The scientist disciplines himself in formulating exact plans for research. He disciplines himself to be a meticulous observer and recorder, to make careful reports and cautious claims, and to accept criticism.

The scientist not only sees what will happen, he tries to understand why it will happen. As he learns more of the why, he becomes more accurate in predicting. He is either a watcher or a tinkerer—the natural historian or the experimenter. Both are necessary. Generally, the watchers have preceded the tinkerers. They had to see what was there before they started working on it. Just to go out and collect was important and sufficient 50 or 75 years ago.

Experimental Biology

In the past 50 years, the Biological Survey, the Reindeer Service, and others in Alaska have

By Margaret Lantis, Ph.D., anthropologist, Arctic-Desert-Tropic Information Center, Maxwell Air Force Base, Ala. This and the following brief are from one paper.

made field experiments, necessarily uncontrolled for the most part; hence, with more hope than prediction. Then, in 1948 the Arctic Health Research Center of the Public Health Service was established. Its work leads us to the real objective of science, from a humanistic standpoint: treatment and prevention. Along another line of development is biological engineering, one form of which is exemplified in the Fishery Products Laboratory, another new institution in Alaska. There is also the Agricultural Experiment Station. But laboratory experimentation in special fields of zoology and physiology is recent in Alaska.

In other new programs in Alaska, the scientists are, as usual, looking ahead, in application as well as in the formulation of theory. This is especially true when we are studying behavior. Are the southeast Alaskans successfully combating tuberculosis while the interior Indians are not? Ten or 50 years later, no doubt one can say what happened, but he may have difficulty answering the questions of why and how. It is important, therefore, to study events while they are happening, not after they happen.

The modern scientist is just the opposite of the popular stereotype who mounts moths on pins but is unaware that caterpillars are destroying the orchard. Even if he is not an economic entomologist, the modern scientist, because he is so interested in processes, in the dynamics of life, is a Johnny-on-the-spot, watching the processes as they occur.

The Social Sciences

Sociology has suffered from both internal and external difficulties. Internally, there was too much and too early emphasis on social pathology. The curriculum contained courses labeled "criminology," "social disorganization," and "problems of social welfare." Ecology seemed to become only a study of blighted areas of cities. Lectures on "the family" dealt chiefly with family disintegration and divorce. The sociologist and some of his fellow social scientists always seemed to show up the worst in the community. Just by trying to be disciplined scientists, they antagonized many laymen, especially civic boosters.

The psychologist has had the same difficulty whenever he went beyond a study of special

abilities. In the study of the dynamics of the personality, there was more "abnormal" than "normal" psychology. And the layman felt uncomfortable and suspicious. Instead of being reminded how remarkably subtle and clever, yet consistent and strong, is the individual personality, he was made to feel that he was full of irreconcilable conflicts and about to go off his rocker.

Fortunately, in sociology, social anthropology, and social psychology the early stage of discovering all the awful things that are wrong with man—his logic-tight compartments, sibling rivalry and Oedipus complex, racial prejudice, and culture lag—has been passed.

Now, in psychology we are hearing about ego strength and ego ideals; in anthropology, about the cultural values—the commonly shared concepts that people live by; and in sociology, about the processes of achieving consensus or agreement. These topics of study are not only positive, they are dynamic.

The Natural History Stage

It is hard to experiment in the field of human relations when it is still in the natural history stage. We who make field studies as well as theorize about people and politics are the natural historians of man, trudging up and down the hills of society. But we now have a much better understanding of scientific problem and the formulation of hypothesis. And we have more sense in the use of special tools for field study; for example, opinion polls. It does seem that in many fields there is a renaissance of good old field observation, a refined natural history done with remarkable new tools.

Some of the social scientists also are seeing the value of a well-rounded natural history, not because they went too rapidly and exclusively into experimentation but because they tried prematurely to formulate rigid laws. Economists, for example, have found that economic man is at the same time social man and political man. Another difficulty, or supposed obstacle in social science, is the complexity of human behavior. Actually, it is not as complex as, for example, the chemistry of the human body. The only difficulty is simply the lack of data: the number of scientific observers for such a very big subject is very small.

The Social Sciences

PHR Where does Alaska fit in the trend of science? What should the scientist study in Alaska? Clearly Alaska needs people working in basic social science, studying processes of the formation of a new society. For nowhere—certainly not in Alaska—is there now enough of basic science in the field of social relations. Yet few areas offer better opportunities to study the social dynamics of a city virtually from the beginning than does Anchorage with its population growing so fast that it's almost a demographic explosion. Social organizations are multiplying in Alaska like rabbits in Australia.

Alaska offers a manageable field for study. Its communities, although growing, are not yet too large or too suburban to be studied profitably as functional entities. Whether the communities and the clubs and the customs are just starting or are dying, as some Alaskan villages are, the interrelationships throughout the Territory and between it and the States can be studied. Migration can be stated more exactly in Alaska than, for example, in a single State.

Every real scientist accepts the necessity of prediction. And Alaska needs prediction, if it is not to become a neglected social and political jungle. It needs not only the field observer and the basic scientist, it needs also the man who will apply the generalizations to specific problems. Everyone suffers from the malfunctioning of social institutions, and some suffer from the changes that must be made. The social scientist may be unwilling to commit himself on a prediction, or he may make a mistake when he does commit himself, but we need him in Alaska so much that we can risk giving him a crack at the job.

The Study of Man

Except in the specific field of health, there is no research agency in Alaska comparable to the Geological Survey and the Fish and Wildlife Service for studying the most important animal

By Margaret Lantis, Ph.D.

of all: man himself. The Geological Survey is studying the processes of solifluction and the boundaries of permafrost. Because of its work, engineers today and in the future can build better on permafrost.

In contrast, no one is learning how to handle the processes of competition and cooperation so that there won't be a "frost-heave" in the community every summer when migratory workers come in. No one is studying the shifting boundaries between private development of a new area and government development.

A scientific discipline's usefulness depends not only on its ability to do the necessary job but on its being given the opportunity to work. Many of the natural and physical sciences have had this opportunity in Alaska; now the social scientists need their chance. I don't want to imply that they are completely absent from Alaskan research, for I know of 11 recent and current social science studies. Four are being made by economists, and others are by anthropologists, physicians, housing specialists, and church workers. Sociologists and political scientists, however, are absent.

Every frontier region has to reach a certain stage of social organization before it can support professional specialization. Each of the American frontiers in succession seems to have gone through similar stages. Alaska offers just as exciting opportunities to the sociologist or social psychologist as to the archeologist who finds there ancient cultures beautifully kept on ice. Alaska contains all the stages of modern American culture, not on ice but decidedly viable and excitable. Alaska has little deadwood in its society and few vested interests.

Ready for Study

Alaska is at the right stage of general cultural development to accept professional social study of itself. Of course, we can expect public opposition to social science in Alaska; we can also expect disappointing and inadequate work by the social scientists. It is hard enough to understand an ant colony. How much more difficult to study ants with ideas!

At Alaska's present stage of readiness, perhaps it only wants to know how big it's getting to be. Perhaps it only wants to know how

many robbers it has in order to decide how many cops it needs. Such counting of heads or sticky fingers is not enough. Instead of merely surveying the social pathology of the Territory, or of surveying anything, we need to study dynamic processes. Although Alaska is not the only new society and new economy that might be studied, and even though many processes at work there may have been observed elsewhere, it does offer a fine new opportunity that should not be missed. I suppose volcanologists did not make any stupendous discoveries from Paracutin, but I'm sure some of them managed to get to that cornfield where a little volcano was sprouting.

Socioeconomic Trend

What should we study in Alaska? Examine, for example, the socioeconomic trend of development, and consider what we must know in order to accommodate that trend, to adjust to it.

Agriculture will increase in some parts of Alaska, but as in Norway and Sweden, mines, manufactures, and fisheries can support a growing population and economy far better than agriculture. A nonagricultural region like Alaska can be economically useful in production of raw materials, in processing and manufacturing, and in provision of services including trade. Until recently, the Territory's economy has been based almost exclusively on the exploitation of natural resources: fur-bearing and oil-bearing animals, fish, minerals, and, to a small extent, timber. With the exception of fish, virtually all products were shipped out unprocessed.

Now that the Alaskan economy is getting its new start by means of a construction boom, the first requirements are for local processing plants to provide construction materials, power to run the plants, local skilled labor, and the service trades. Getting out raw materials with modern technology means few men and much heavy equipment. Processing plants and especially the service facilities require workers. A particular type of economy facilitates or even requires a particular type of society and political organization. Little enough is still known about the relations between economy, society, and politics; and Alaska is just the place to

study them. As examples, I suggest studies of the following questions as necessary, and practical:

Concepts of capital. What are the attitudes of old settlers, of newcomers, of the different native peoples toward land—land as an investment, as a place to live?

The people and their skills. What types of people are coming to Alaska? What has been their level "outside"? What skills do they have that they are not using? What new skills are they acquiring?

Community structure and political structure. What do new settlers miss most in community life and in political system? What do the native peoples miss most in their present stage of partial acculturation?

Understanding Mankind

In sum, we have three dynamic relationships to study: the people and their material resources; the people and their socioeconomic system; and the people and their political system.

There is, of course, no political system without people. One can talk about a system, but I mean the ideas that individuals live by—their unstated assumptions, their expectations, their struggles to get what they want, in a job or a place in the community. To learn about these cultural values, one does not mimeograph the kind of questions I have just phrased and then distribute a questionnaire. This is a job for professionals, and a tough job even for them.

To make life more satisfactory for Alaskans, one must study Alaska. But in undertaking the processes of behavior in any group, one understands more about mankind and contributes to basic science.

Enteric Diseases



Vital to the control of enteric diseases in Alaska is the provision of safe and adequate water supply and sewage disposal systems.

Of the 63 communities in Alaska with populations of 200 or more, only 29 have limited

water distribution systems. Only 5 have community sewage disposal facilities. In the other 223 Alaskan communities, individuals obtain water from single premise wells, community wells, rivers, lakes, lake ice, or snow fields. These communities and villages dispose of sewage through single premise systems, by scavenger service, or by dumping the collected wastes not far from the dwellings.

Contaminated water supplies and improper sewage disposal have been the major causes of the gastroenteritis outbreaks recently compiled for the period 1900–52 from records of the Alaska Department of Health, Alaska Native Service hospitals, and from other government reports and personal correspondence.

The data are incomplete in some instances because of incomplete reporting and loss of records. One case on the record does not preclude the existence of others, and sometimes only deaths were reported. No cases of bacillary dysentery, for example, were reported in 1944 from the Kuskokwim area where records give this disease as the cause of 97 deaths.

It was not until 1936 that the first public health laboratory was established for the Territory, and diagnostic bacteriological laboratory services became available to hospitals, physicians, public health personnel, and field nurses for enteric disease studies.

But the history of the outbreaks does indicate the extent of enteric diseases, such as typhoid fever, paratyphoid fever, and bacillary dysentery caused by *Salmonella* and *Shigella* organisms. Cases have been reported from Barrow to Ketchikan and from Unalaska in the Aleutian Islands to the Canadian border.

In 10 areas where hospital care, medical facilities, and transportation are available and the reporting is therefore more complete, records indicate that salmonellosis and shigellosis are endemic.

The first mention of an outbreak resembling bacillary dysentery was in 1807 in Unalaska, but until 1900 there were no medical records of

By Frank P. Pauls, M.S., assistant director, division of public health laboratories, Alaska Department of Health, Anchorage.

enteric cases in Alaska. From that date to July 1952 a total of 274 cases (24 deaths) of typhoid fever, paratyphoid fever, and salmonellosis were reported. On record for the 1937-51 period are 340 cases, including 110 deaths, of bacillary dysentery and shigellosis.

Typical Typhoid Outbreaks

Typhoid carriers have been found in the Norton Sound, Nushagak, and Anchorage areas. In 1900, two cases of typhoid fever were reported from Golovin on Norton Sound. These two persons were found to be "healthy" carriers of *Salmonella typhi* in 1941 during an epidemiological investigation of a typhoid fever outbreak in the Golovin-Elim area. And one of them, a trader who visited the villages along Norton Sound, was linked with the outbreak. From 1900 to 1941 there were 24 cases, 3 of them fatal. The carriers were placed under medical care, and no further cases have been reported from this area.

Typhoid fever may have spread to Norton Sound from the Dawson area, Yukon Territory, Canada, where an epidemic occurred in the spring and summer of 1898 during the Klondike gold rush. Deaths were reported to be from 10 to 12 a day during the epidemic. River water was indicated as the source of the infection.

Since 1936, 7 outbreaks of typhoid fever, 4 of them waterborne, have been reported from the Nushagak area, center of salmon fishing and cannery activity. During the fishing season, the Eskimo and Indian families from the surrounding villages move into crowded tent camps with no sewage facilities except convenient bushes or creek banks. They get drinking water from the most convenient pond, creek, or well. In the largest community, a local well is the town supply. Drinking water is collected by clearing away the surface debris of paper and dog hair and dipping the water out. Dogs and men have the same easy access to the well water—there is no curbing or cover. In addition, the well is at the base of a bluff in a ravine that drains the village graveyard 150 feet away. Diarrhea has been prevalent among the children, and villagers expect that some of the children will die every year from this disease.

Altogether, 42 cases (6 fatal) of typhoid fever

are on record for the Nushagak Bay area since 1936. In 1951, the mother of a child with typhoid fever was discovered to be a carrier of *S. typhi*. Several other possible carriers have been detected.

In the Anchorage area, carriers were found in the 1947, 1950, and 1952 outbreaks of typhoid fever. *S. typhi* was isolated from the 17 children and from the carrier, the mother of one of the children, in the 1950 outbreak, occurring in a congested area outside the city limits. Residents were dependent on shallow wells of 6 to 12 feet deep for water and single premise sewage disposal.

Diarrhea Prevalence

The rumors of diarrhea outbreaks that frequently sweep villages and the delayed reports that reach the Alaska Department of Health are typical of dysentery reporting in Alaska. The outbreaks commence during or shortly after the spring breakup and continue to the end of summer.

In the 1948 outbreak in the Barrow area, there were 105 cases (1 death) during a 5-month period. A field team isolated *Shigella paradysenteriae* from stool specimens of 3 cases. The following year bacillary dysentery was reported from Anaktuvuk Pass and *S. paradysenteriae* was found in 5 cases. In both outbreaks contaminated drinking water was indicated as the source.

The Unalaska bacillary dysentery outbreak in 1949 was the first opportunity for a complete epidemiological team—physician, sanitarian, and bacteriologist with field laboratory equipment—to investigate an outbreak in Alaska, determine the etiological agent, and offer sanitary and medical aid. Investigation proved the epidemic to be a waterborne bacillary dysentery outbreak caused by *S. paradysenteriae*. Recommendations were made for improving sewage disposal methods and relocation of the water supply.

The Unalaska bacillary dysentery outbreak teric diseases are Fairbanks-Nenana, Kotzebue Sound, Kuskokwim, Juneau, and Ketchikan.

In all the outbreaks, whether waterborne or foodborne, poor sanitation plays an important part. Influx of people into crowded areas increases the health hazards already complicated

by unsatisfactory basic sanitary facilities, since the newcomers bring with them their own diseases, and carriers of typhoid fever and parasitic infestations are undetected in this group.

Animal-Borne Diseases



The study of diseases transmissible from lower vertebrates to man has been carried on since 1948 in Alaska by the Arctic Health Research Center. Emphasis to date has been placed on diseases of helminthic origin.

Hydatid Disease

It has been recognized for many years that the tapeworm *Echinococcus granulosus* exists in North America and that the wolf and the moose are essentially involved in its natural life cycle. Ruminants other than the moose may also serve as intermediate hosts, and dogs and foxes often harbor the adult parasite.

Postmortem examinations of canine animals as well as the moose have disclosed that this parasite is common in Alaska. As high as 25 percent of the sledge dogs in certain villages have been found infected. The necessarily close association between man and dog in Alaska provides ample opportunity for human infection, which occurs as a result of the ingestion of tapeworm eggs eliminated in the excreta of canine animals. Living conditions in the far north often make impossible the sanitary precautions necessary to prevent human contact with the parasites.

On St. Lawrence Island, a much more pathogenic form of *Echinococcus* has been found. Its natural life cycle involves the arctic fox and at least two species of small, mouselike rodents; thus, the development of an effective control program would not be feasible should this tapeworm become established on the mainland. Dogs are as readily infected through eating

infected rodents as are foxes, and it is probable that most of the human infections are attributable to eggs disseminated by infected dogs. It is hoped that introduction of this disease into continental North America can be prevented by rational quarantine measures. Stringent control of dogs, particularly on St. Lawrence Island, is recommended. An educational program is badly needed to inform the people of the importance of this disease.

Trichinosis

An investigation of the prevalence of trichinosis in Alaskan mammals was undertaken in 1949. It was found that a wide variety, including bears, dogs, wolves, foxes, and wolverines, often harbor *Trichinella spiralis*. The parasite was also recorded from tree squirrels. A white whale was found infected, and larvae were recovered from hair seals. It is probable that trichinosis is transmitted to man from bears more often than from any other group of Alaskan mammals. Polar bears are sometimes eaten under conditions which preclude adequate cooking. The problem of trichinosis, however, is not considered a serious threat to human health in Alaska.

Diphyllobothriasis

A survey of possible terminal hosts of cestodes of the genus *Diphyllobothrium* has disclosed their occurrence in a variety of mammal species, including, besides man, bears, dogs, and foxes. They have also been observed in gulls and eagles. No comprehensive survey of the fish intermediate hosts of this tapeworm has been made, but it is obvious that in certain areas most trout exceeding 6 inches in length are infected. Some contain so many plerocercoids that fishermen consider them unfit for food.

No attempt has been made to evaluate the importance of *Diphyllobothrium* to human health. In regions where fish make up a high proportion of the diet (for example, lower Kuskokwim-Yukon country) incidence of human infection is high. Treatment so far has little value because of the probability of immediate reinfection.

If it can be established that a single species of *Diphyllobothrium* occurs in the various car-

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nivores, birds, and man, the problem of control will be complex. Infected birds particularly would serve to maintain infection in fish. Much work remains to be done on this problem.

Diseases of Nonhelminthic Origin

Important in Alaska among diseases of non-helminthic origin is rabies. Known to be enzootic over most of the Territory, it constitutes an ever-present threat to public health. Almost every year there is an outbreak among wild or domestic canids somewhere in the Territory, but so far it has not been reported to attain epizootic proportions.

The great numbers of stray dogs to be found at any time around the larger towns, particularly Anchorage and Fairbanks, constitute an animal reservoir through which rabies might spread rapidly if once introduced. There is no provision for dog control outside the limits of incorporated towns, and control within their limits is far from adequate. No program for vaccination of dogs has been established, and there is little expectation of any.

Tularemia in man is rarely reported in Alaska, although it has been known for several years that it does occur. With increasing sport hunting of hares in the populated portions, this disease may attain some importance.

Various other diseases—brucellosis, leptospirosis, ratbite fever—have been investigated to some extent in Alaska, but their present status is indefinite. It is anticipated that these diseases and many others will receive attention in coming years.

Hydatid Disease Control

PHR Hydatid disease is a global problem, representing a serious public health menace on every continent. Recent studies have shown that the disease is spreading from major foci of infection and

have also discovered endemic areas that were heretofore unrecognized.

Noting the importance of hydatidosis both as a human infection and as a cause of losses in food supplies, the Third World Health Assembly (1950) requested the World Health Organization "to lend technical assistance for its eradication upon request of government authorities." In the Western Hemisphere, the Pan American Sanitary Bureau has provided assistance and international coordination to member governments in their antihydatidosis activities. Control efforts emphasize anthelmintic treatment of dogs, centralized slaughtering with sanitary waste disposal, and public health education.

Control Points

The cycle of the parasite *Echinococcus granulosus* may be interrupted by prevention of infection of the primary host (dogs, foxes, wolves, and so forth) and by prevention of transmission from the canine host to other animals.

Proper disposal of the organs of animals containing hydatid cysts will prevent the infection of dogs. Organized meat inspection to accomplish this is not practicable in all parts of the world. Furthermore, meat inspection would have no effect upon the cycle of the hydatid parasite when the secondary hosts are wild animals, a situation which obtains in Alaska.

Canine Control

It therefore appears that the most practical method of interrupting the cycle of this parasite is to attack it in its primary host, the canine. In dogs, mass deparasitization may be practiced. The great strides in hydatidosis control in Iceland are attributed in large measure to enforced limitations on the number of dogs and the periodic anthelmintic treatment of all dogs. A similar approach has been followed in Argentina, where antiechinococcal treatment of dogs is given free. This work was begun in Patagonia in 1948 and has since been carried on extensively in several other parts of Argentina. Large-scale antiparasitic treatment of dogs has also been practiced in southern Brazil.

Mass deparasitization of dogs requires community organization and enlightened public cooperation. Dog owners must be encouraged to have their dogs treated, and individual action

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should be supplemented by public clinics. The dramatic action of the most widely used deparasitization drug, which purges within a few minutes, affords opportunity to demonstrate to a dog owner the existence of parasites in his dog.

Obviously mass deparasitization cannot be practiced on wild canids nor on stray dogs. However, the methods used to apprehend and eliminate the ownerless dogs may be equally applicable to the wild carnivores which carry the adult tapeworm.

A Distemperlike Disease

PHR Death or incapacitation of a large proportion of a community's dogs is a real disaster in the far north.

When an Eskimo community is deprived of its dogs, it loses the principal means of transportation. The Eskimo lives by hunting, and his dogs are his only draft animals. The loss of dogs also impairs national defense in the northern perimeter, since without a dog team extended ground scouting is impossible in the winter.

Modern transportation has complicated the control of animal diseases in Alaska as it has human diseases. For example, a New York City dog can reach Barrow by air express in less than 30 hours. This hypothetical dog may have had rabies immunization and may have been passed as "healthy" by a thorough veterinary examination. Yet, if he travels by air, he can become acutely ill in Barrow from a disease contracted in New York.

Point Barrow Epizootic

A severe epizootic of canine distemper, or a clinically related disease, occurred at Point Barrow, Alaska, in the fall of 1951 and continued into the winter. About half the dog population, an estimated 500 dogs, died or had to be destroyed because of the effects of the

disease. Administration of penicillin and streptomycin and destruction of incapacitated dogs probably hastened the natural end of the epidemic. The distemper is continuing enzootically in Barrow.

Early in July 1952, a similar or identical disease that may have been carried from Barrow by wildlife appeared among the dogs at Anaktuvuk Pass, an isolated village 200 airline miles from Point Barrow across the Arctic Slope. In the summer this terrain is traversed only by wild animals. In the winter a trip between the two places is seldom made.

The symptoms of the disease observed in the dogs at Barrow and Anaktuvuk were about the same as those of the canine distemper caused by the Laidlaw-Dunkin virus. The extreme virulence of the distemper seen in Barrow and Anaktuvuk dogs was notably different from that ordinarily seen in the States.

Chorea and other neurological disorders in the Alaskan dogs commonly coexisted with the acute symptoms of nasal and eye discharge. Neurological symptoms—hyperexcitability, chorea, paresis, and sometimes convulsions—do not ordinarily occur early in the course of the disease in the States. The course of the disease in some of the Barrow dogs was peracute—death occurred within 24 hours of the onset of symptoms. In some instances, entire teams collapsed while out on trek and had to be destroyed.

Immunization Project

Immunization studies were started in August 1952 at Barrow, Anaktuvuk, and Wainwright to evaluate the possibility of controlling the disease by blanket or partial inoculation with attenuated canine distemper virus vaccine. All dogs available at Anaktuvuk (about 190) were inoculated to test blanket administration of attenuated virus vaccine.

At Barrow, some of the dogs brought to the immunization clinic were given vaccine and others were given a placebo. Selection was made by a random number system. Although response was poor—only 121 dogs were brought in—it may be possible to learn how vaccinated dogs and litters, with half the pups vaccinated, fare in an enzootic area.

By Karl R. Reinhard, D.V.M., veterinarian, Rocky Mountain Laboratory, Public Health Service, Hamilton, Mont.

The same random inoculation system was used on the 178 dogs brought to the clinic at Wainwright, a village possessing about 200 dogs. Two dogs had died the previous winter of a disease reported as similar to that in Barrow. Half the dogs were immunized to determine if this immunization level would induce pack immunity and protect the dogs of Wainwright against future extension of the disease from Barrow.

Mosquito Control



Mosquito control among Alaskan civilians is still rather primitive. It is almost wholly unorganized; is only slightly mechanized; and is improvident in that only small stores of materials and equipment are maintained. Civilian control is strikingly primitive in that the only measures used are those that give temporary relief. Little effort is made to prevent future attacks by destroying insects in vulnerable but nonbiting stages. Little is done on more than an individual or single family basis.

The military control program has achieved a high degree of organization and mechanization. Airplane spray is stored in strategic locations. Frequent estimates of the insect populations at widely separated bases are sent to the headquarters at Elmendorf Air Base. When the severity of the mosquito attack warrants, a spray team in a specially equipped C-47 is dispatched to do the necessary spraying.

The civilians, largely dependent on their bottles of repellent, lack organization and must pay for their projects. Even though the Territory is generally prosperous, the demand for capital is great. When the well is not yet dug and there are no windows in the house, insect control is apt to rate a low priority on the list of projects.

By Charles S. Wilson, M.S., entomologist. Arctic Health Research Center, Public Health Service, Anchorage.

Obstacles to Control

Many Alaskans would be willing to spend large amounts for mosquito control by stateside standards, but without organization they can do little.

For example, an aerosol spray unit for protecting single premises was an early product of the Arctic Health Research Center. In actual operation, this apparatus seems suitable for single family use. The problems of manufacture and supply have not yet been solved, however. Without the protection of a private patent, no manufacturer wants to produce the special nozzles required. Without an assured market, merchants are reluctant to stock the airplane type of spray solution required. If a market were available for only 50 units, the picture might change, but at present the device is used chiefly by the Air Force and by some nonprofit summer camps. Both groups are sufficiently organized to obtain insecticide before the mosquito season. The Air Force makes its own nozzles. The summer camps obtain them from the Arctic Health Research Center in return for cooperation in testing.

Around Fairbanks and Anchorage are civilian areas where many military personnel live off-post. These would benefit from an extension of the military spray operations. Although the organization of cooperative projects would seem to be advantageous, military regulations require: first, waiver of claims; next, right of entry to any private property sprayed by military planes; and third, contribution toward the cost according to the interest of the parties concerned.

Spraying property without legal authorization is trespass. Direct negotiation with each landholder for permission to spray may be possible in isolated areas, but it is practically impossible in the residential and suburban districts of Fairbanks and Anchorage. Some means must be found for obtaining blanket authorization and general assessment of the costs before spray programs can be developed for urban districts. Organization will certainly be called for if the advantages of airplane sprays are to be utilized.

The Alaska Department of Health has authority to spray private property when there is

threat of epidemic. Annually recurring mosquito seasons are not epidemics within the usual meaning of the term, although it may be argued that the itching sores resulting from insect attacks constitute diseases. However, the department has too many serious problems definitely falling within its province to be likely to seek authority for compulsory mosquito control.

Future Projects

The present program of insect control of the Arctic Health Research Center is largely devoted to development of methods and equipment for spraying with light airplanes such as those used by "bush" pilots. The chance of success seems fairly good, and if suitable methods and equipment for light planes are developed, the possibilities of acceptance and use appear to be very good. The greatest need, however, is for protection of the homesteader and isolated worker.

With bush pilots in the mosquito control business, the work will be mechanized, and the necessary stores of insecticide and equipment will be maintained by the pilot or his organization so that the word "improvident" will no longer apply. If costs can be made sufficiently low to permit wide use of airplane sprays, the necessary organizations will almost certainly develop. Then the advantages of mosquito larvicide may be utilized, attacks on the vulnerable larvae of black flies will become possible, and Alaskan insect control will have emerged from its primitive condition.

Mastoiditis

PHR When large segments of a country's population are afflicted with a disease that interferes with education and ability to earn a livelihood, this disease becomes a public health problem.

In Alaska, mastoiditis is a public health problem. An incomplete survey of the population indicates that about 3,000 persons are afflicted with chronic mastoiditis of one or both ears.

Costs for surgical treatment of mastoiditis amount to about \$1,000 per patient, including

costs of transportation to a hospital, of hospitalization, of drugs, and of residence in a convalescent home until recovery. When hearing has been so badly impaired that even a hearing aid is not effective after surgery, persons must be sent to speech centers, at a further expenditure of money for transportation, subsistence, and tuition.

The great prevalence of mastoiditis in Alaska is due to many factors. It is estimated that 90 percent of the cases are among the Eskimos, Indians, and Aleuts. These people have become so inured to hardships that they tend to underestimate the importance of any ailment that is not immediately and obviously a threat to life. Other reasons for the prevalence in Alaska of this now "obsolete" disease are the distance of these people from adequate medical care; ignorance of the importance of the common cold, of tonsillitis, and otitis media and of how to recognize and treat these afflictions; and the lack of readily available hospital beds and of funds for carrying out simple, efficacious programs of prevention and treatment.

Proposed Prevention

Educational efforts must be directed to non-medical persons in the small villages who are interested in the health of their fellow citizens. They should be taught the value and proper use of simple nasal decongestants.

The nurses of the Alaska Department of Health and the Alaska Native Service should be taught the proper use of intranasal medications and of an agent applied topically in the external ear. They should also recognize the importance of removing tonsils and adenoids from children who have demonstrable hearing loss during head colds. The nurses should be required to report the names and other data on all patients who have a history of earaches or hearing loss with common colds, repeated attacks of otitis media, chronic otitis media, and chronic mastoiditis. For cases of chronic mastoiditis, which is recognizable by its continual

By Milo H. Fritz, M.D., Anchorage, consultant in ophthalmology and otolaryngology to the Alaska Department of Health.

discharge and extremely foul odor, the nurses should be taught the value and use of glycerite of hydrogen peroxide in keeping ear cavities clean and sweet and also that it does not cure the underlying pus-forming or suppurative process.

Itinerant physicians working for both government agencies and physicians in more or less fixed installations who have an orbit of activity in surrounding towns and villages should be taught how to administer a general anesthetic in the field and how to remove tonsils and adenoids.

Coordination With Universities

Another physician and I have gone to small villages from time to time and removed from 20 to 30 pairs of offending tonsils and adenoids in a period of 2 or 3 days. Two or three summers of this type of activity with university-sponsored physician-anesthetist teams and equipment would go far in reducing the continued development of cases of chronic mastoiditis.

Two universities (Duke University and University of Oregon) have participated so far in a program of sending members of their resident staff to Alaska for 6 months' training under supervision of the consultant certified by the American Boards of Ophthalmology and of Otolaryngology. It is hoped that other university medical schools may be encouraged to include such training as part of their formal residency programs.

Two Water Systems in Northern Canada

PHR Water works engineers in Northern Canada and Alaska are faced with unique design and maintenance problems. Preventing the freezing of water and sewer lines is paramount to design and maintenance in northern climates, a factor which raises both construction and operating costs many times higher than those in more temperate regions. Avoiding the winter cold,

utilizing the sun's radiant heat in winter and summer, yet keeping excavation to a minimum and maintaining the lowest possible maintenance expenditures are some of the problems to be met. Temperature variations of different types of soil under various moisture conditions in disturbed and undisturbed ground and in various climatic regions need to be determined.

Two all-weather underground water supply systems installed within the last few years in the Northwest Territories of Canada have proved successful.

Yellowknife

One system is at Yellowknife, where the mean annual temperature is 22° F., and the top of the permafrost is 10 feet or less from the surface of the ground. Annual precipitation is 10 inches, and snowfall is sparse. Water is pumped from a bay, chlorinated, heated, and circulated through a grid system 3,500 feet from the pumphouse. Part of the water is returned to the pumphouse for reheating and recirculating.

Each main and house connection has a return line beside it. Water lines are of cast iron pipe, laid at 5 feet 6 inches minimum cover and to grade for drainage. Both 6-inch supply and 4-inch return mains, which are side by side, are insulated with approximately 1 foot of compacted moss on the top and sides and from 0 to 2 inches underneath. Extremely fine sand with granite outcroppings covers the area.

Meters and recording thermometers are located on discharge and return water lines in the pumphouse, and thermometer wells are located in the mains at the manholes. The water is heated from November through May. Originally installed in the pumphouse were two 60-hp. and one 80-hp. return tubular boilers, but one firebox and diffuser has been reduced to give roughly 15 hp. capacity. Under normal conditions, two ¾-inch copper lines are used

By Stanley S. Copp, M.S., sanitary engineer, Department of National Health and Welfare of Canada, Edmonton, Alberta.

for heating the water, one injecting into the recirculation line and one into the intake well. Outgoing water from the pumphouse is maintained at about 41° F. During March, when 80 percent of the outgoing water is recirculated, the temperature of the return water is about 40° F. On June 30, 1952, 1 month after heating was discontinued, the discharge temperature was 50° F., and temperature of the return water was 46° F.

Of the 37 fire hydrants, all of the dry barrel type, on the grid system, 8 froze last year. The most serious freezing occurs when circulation fails and the bottom of the hydrant freezes, but this happens infrequently. Caps and spindles at the top and at the drain opening at the bottom freeze often. Above-ground freeze-ups are thawed with blow torches; those below ground, by placing a fire pot in the manhole box overnight. Alcohol antifreeze is applied to caps, packing, and so forth, and hydrants are checked twice a week.

Five major breaks caused by frost action in the winter of 1952 were repaired without interruption of service. Excavation of breaks with jackhammers takes about 2 weeks per hole because of the hardness of the frozen ground. Bits are dulled and broken at about the same rate as in breaking concrete. Powder cannot be used because of the proximity of pipes, and holes cannot be backfilled until the frost is gone. Any interruption of service longer than one-half hour results in freeze-ups. None of the 142 service connections located at an average depth of 5 feet were frozen under normal operating conditions.

Fort Smith

About 175 miles farther south at Fort Smith is a system which preheats the water and utilizes bleeders at dead ends. The settlement has a mean annual temperature of 25° F. The soil is a fine sand.

Two intakes drilled horizontally through 40 feet of solid rock into rapids on the Slave River supply water to pumps on the edge of the river. From there, the water is pumped to a treatment plant on the top of the bank. Alum and soda ash are added, and the water is spirally mixed upward, settled, filtered, chlorinated, and stored in a reservoir under the plant. The

treated water is then heated and pumped through a pressure tank to the distribution system.

Transit pipe is used for the distribution system, which is laid at an average depth of 10 feet and a minimum depth of 8 feet. Minimum depth for house connections was specified for 8 feet, but some are laid at only 6 feet and are frozen several times during the cold weather.

The temperature of the river water varies from 32.8° to 65° F. In January, water leaving the plant at 42° F. is cooled to 35° F. at the end of the system. On April 7, 1952, the 4-inch main at the end of the system froze, disrupting two services. The frost penetrated 14 feet at this point. The two intakes from the river froze, and a gasoline pump had to be used to pump water over the ice to the wet well. Several house connections were frozen for a short period, two for more than a day.

Conclusion

Permafrost, which reaches nearly to the surface at Yellowknife, is not the insurmountable obstacle it was once considered to be. It is hoped that these two experiences may lead to less costly systems which permit other supplies to be installed and operating expenditures lowered. Installation costs may be lowered by consolidation of settlements so that lengths of water lines may be kept to a minimum and expenditures shared. With the installation of more water supply systems, the northern areas may become more developed and modernized, and waterborne epidemics may be reduced or eliminated.

Water Pollution Studies



Comprehensive physical, chemical, and biological investigations of the waters of Alaska were initiated by the Alaska Water Pollution Control Board in the summer of 1951. New industry

By Amos J. Alter, C.E., M.P.H., administrator, and William L. Porter, M.P.H., chief of field investigations, Alaska Water Pollution Control Board, Juneau.

and an increasing population in Alaska, as well as a territorial-wide awakening to the health and economic threat of polluted streams, coastal waters, and lakes, have prompted Alaska to plan for the orderly use of her waters. Alaska is in a strategic position for practicing preventive water pollution control rather than the more expensive corrective control.

Ward Cove Study

In order to develop the water resources of Alaska, careful and complete investigation of water assets and liabilities and logical matching of type and extent of water use must be undertaken. The first attempt to evaluate water assets and liabilities is being made at Ward Cove, located on Tongass Narrows about 5 miles northwest of Ketchikan. The Ketchikan Pump Company is constructing a pulp mill at this location. The cove is 1 mile in length and at mean lower low water tide it contains about 25,500 acre-feet of water. It is surrounded by heavily forested mountain slopes. Rainfall averages about 150 inches annually. Discharging at the head of the cove is Ward Creek, a swiftly moving stream dropping quickly from the mountain slopes to the cove.

Observation of the following characteristics of water in the cove was begun October 1, 1951, for completion on September 30, 1952: types and numbers of marine plants and animals; water temperature, turbidity, and color; tidal movement and exchange; fresh water discharge into the cove; type, strength, and general characteristics of wastes entering the cove; dissolved oxygen concentration, percentage of oxygen saturation, and 5-day biochemical oxygen demand; most probable numbers of coliform bacteria; total solids, dissolved solids, ignited dissolved solids; and pH, chlorides, sulfates, iron, magnesium, and calcium.

Preliminary Report

Almost 4,000 physical, chemical, and biological examinations were completed by August 7, 1952. Calculations based on the data collected will reveal the degree of waste treatment and/or dilution necessary for orderly use of the waters of the cove and will provide a background of basic data necessary for later evaluations. A preliminary review of the observations presents interesting trends.

Chemical. Dissolved oxygen concentrations during the winter and spring were generally 80 percent of saturation or over. During the summer months the upper water strata were supersaturated during the day as a result of biochemical photosynthesis. There was a decrease of dissolved oxygen in the lower depths during the fall to the extent of a noticeable oxygen sag.

Chlorides, sulfates, alkalinity, and calcium varied inversely as the water temperature; pH varied directly as the water temperature. No trend is yet apparent for solids, magnesium, and iron in analyses of samples from October 1951 to January 1952.

Biochemical Oxygen Demand. The biochemical oxygen demand (B.O.D.) was generally below 0.5 ppm except during July and August. At that time it increased to over 1 ppm.

Physical. Temperatures of surface waters ranged from 4° C. in March to 16° C. in August, and from 5° C. in March to 10° C. in August at the 100-foot depth. Turbidities ranged from 0.32 to 3.2 ppm. Color was generally less than 5 ppm.

Biological. There is abundant marine life on the shore, on the bottom, and in the waters of the cove.

Hydrological. The fresh water current from Ward Creek has little effect on the cove waters except during or near flood run-offs, and then it is limited to the top few feet of surface water near the creek mouth and to an area of from 100 to 200 feet in width through the center of the cove.

Nearly all the movement of the tidal waters to and from the cove is surface movement above mean lower low water. This condition of little or no current at lower depths extends into Tongass Narrows.

Approximately 95 percent of the dissolved oxygen replaced by diffusion to the cove waters takes place above 15 feet below lower low water. The two important sources of reoxygenation of cove waters are the tidal exchange and diffusion above mean lower low water. Any large biochemical oxygen demands at the lower depths would probably result in a septic condition because at these depths oxygen would be replaced slowly. The most critical period with regard to maintaining an adequate dissolved oxygen

concentration was during the period of highest water temperatures, from July 31 to August 7, 1952.

Anchorage Food Study

PHR Alaska is almost completely dependent on long supply lines from the west coast of the United States. Their possible disruption in times of emergency must be considered in civil defense planning.

To obtain estimates of actual food consumption and to compare Alaskan food habits with those of the continental United States, Anchorage and its vicinity were surveyed in 1950 and 1951. Because of the large numbers of military dependents and transient workers in the area, no reliable estimates of the civilian population were available to serve as a population base for the survey.

Food Consumption

Anchorage residents eat well. But Alaskan food habits differ in several ways from those in the States. Food costs are high in Alaska, but wages and salaries are high also and may compensate for the price increases. The higher costs may be disproportionate for some types of food. Perishable foods, and some items not ordinarily considered perishable, may be of poor quality. Finally, the population has an unusually large proportion of young people.

Of milk products other than fresh milk, two-thirds of Anchorage consumption is canned milk, almost five times the average consumption in the States. While consumption of milk and milk products in Alaska is 65 percent of that in the States on a retail weight basis, consumption on a whole milk equivalent basis is 84 percent of that in the States.

Egg consumption is only slightly less. The price of eggs increases in the following order: boat, airborne, local.

Frozen meat, poultry, and fish are shipped by boat. Meat and fish supplied from local sources are about two-thirds wild game and fish, with moose, caribou, and salmon predominating. Meat consumption is unexpectedly high, possibly because meat prices on a percentage basis may not be as high as those of other foods when compared with prices in the States. The high meat consumption compensates to a considerable extent for the low intake of milk.

The consumption of butter and margarine is almost identical with that in the States. However, only one-fourth as much bacon, salt pork, and lard is eaten in Anchorage, probably because of the instability of these products. Use of shortening other than lard is somewhat greater in Anchorage.

The consumption of potatoes in Alaska is understandably high, since prices of this vegetable, particularly the local product, are quite reasonable. Citrus fruit and tomato consumption is low. Consumption of other fruits and vegetables is almost equal to that in the States. Less grain products are eaten in Anchorage, but more sugar compensates for this.

Civilian food consumption was determined by a census of food imported by rail, by truck, and by airplane, and by an estimate of local production in 1950. Direct air shipments, which consisted of meat, produce, and eggs, were actually enumerated for one airline and estimated for another. Truck shipments supplied only a few grocers, and the amount shipped was estimated from the gross sales of these retailers. Distribution of truck shipments into food classes was assumed to be the same as that of rail shipments since both were shipped by boat to Alaska.

The amount of food shipped by rail was estimated by sampling the records of the Alaska Railroad. To determine food classes, 24 of the 126 ships with food consigned to Anchorage in 1950 were selected as a sample with regard to season and type of ship. Every food item, in all more than 5,000, on the ships' manifests was recorded and tabulated to furnish the sample from which the total rail shipments were estimated.

The Alaska Agricultural Experiment Station estimated local agricultural production, and the

By Edward M. Scott, Ph.D., biochemist, and Edward S. Weiss, M.P.H., statistician, Arctic Health Research Center, Public Health Service, Anchorage.

Fish and Wildlife Service estimated wild game and fish consumption.

Food Supplies

The amount of food stored in Anchorage was also determined to provide an estimate of the average period of storage before consumption and of the length of time food stores would last if supplies were cut off.

Dollar value inventories of all retailers' stocks were compiled as of January 1, 1951. A representative sample of retail inventories was selected. The items in each sample inventory were actually enumerated to provide a basis for calculating total food class inventories from total dollar value inventories. Supplies of wholesalers and miscellaneous food handlers

were also enumerated. Those of restaurants were estimated from a sample of dollar value inventories.

The average storage life of imported foods was found to be 36 days for all food classes. For fresh and frozen meat, poultry, and fish it is 21 days; grain products, 76 days; dairy products excluding butter, 34; canned citrus fruit and tomatoes, 55; and other canned fruits and vegetables, 82.

These results indicate that in the event of complete stoppage of normal supplies to Alaska, there would probably be enough staple foods to last until some emergency method of supplying food could be set up. However, many perishable items would become unavailable almost immediately, necessitating some substitutions.



Laboratory Diagnosis of Trichophyton Infections

PART I. Ectothrix Infections of the Beard and Scalp Caused by *Trichophyton mentagrophytes* and *Trichophyton faviforme*.

PART II. Endothrix Infections of the Scalp Caused by *Trichophyton tonsurans* and *Trichophyton violaceum*.

35 mm., sound, color, Part I—13 minutes; Part II—10 minutes, 1952.

Audience: Laboratory technicians (bacteriologists and mycologists), State and local health department laboratory directors, medical and veterinary students, dermatologists, and physicians and nurses interested in this problem.

Available: Loan—Public Health Service, Communicable Disease Center, 50 7th St., NE., Atlanta 5, Ga. Purchase—United World Films, Inc., 1445 Park Ave. New York 29, N. Y.

These films are designed to aid in teaching the procedure for identifying the etiological agent responsible for certain types of ringworm infections involving the hairs of the scalp and bearded areas. The preliminary procedures and final observations by which the medical technician (bacteriologist or mycologist) or dermatologist may isolate and identify the



Characteristic suppurative lesions caused by ectothrix *Trichophyton*.



Microscopic mount for *Trichophyton mentagrophytes*.

responsible fungi are depicted.

The films show the possible sources of *Trichophyton* infections, the method of examining the patient and of obtaining and examining the clinical material. They show the cultural methods used for isolation and the techniques for identifying the fungus agent when it is isolated. Part I is concerned with ectothrix infections, and part II with endothrix infections.

The Composition of the Sanitary Engineering Profession

The sanitary engineer is largely a North American phenomenon, the result of efforts to protect health and prolong life through an attack on the environmental influences which cause disease.

In order to determine the nature of the sanitary engineer—who he is, where he works, what his activities are, his age, professional and educational background—an analysis was made by the Division of Engineering Resources, Public Health Service, based upon data loaned to the division by the American Public Health Association. The data were originally collected by the American Public Health Association for the purpose of establishing the Roster of Public Health and Sanitary Engineers.

The survey was conducted from the spring of 1949 to October 1950 by a self-coding questionnaire. A total of 10,757 questionnaires were sent to persons whose names were obtained from the membership lists of various engineering associations and professional engineering registration lists. There were 6,368 respondents of whom 4,933 felt that they met the definition of a sanitary engineer as set forth by the National Research Council. Following careful editing with respect to educational and professional qualifications, 4,116 remained as the base group for the study.

On the basis of the survey it is estimated that there were, in 1950, 5,000 sanitary engineers in the country—33.2 per million population. Of those who participated in the survey, two-thirds devoted more than three-fourths of their time to sanitary engineering activities (discussed as group I); about 19 percent between 50 and 75 percent of their time (group II); and 19 per-

cent less than 50 percent of their time (group III).

A relatively small proportion (35 percent) of sanitary engineers has a formal sanitary engineering education. There is a considerable rise in the educational level, as is seen in the shift toward more sanitary engineers in the "master's" and fewer in the "no degree" levels in the younger age groups. Sanitary engineers in group I are better educated than those in group II and III. In group I, 28 percent have reached the master's level; for groups II and III the percents are 13 and 11, respectively.

The civil engineering curriculum has provided the basis for the undergraduate education of most of the members of the profession. In regard to experience, broadly speaking, almost half of all sanitary engineers have obtained a significant part of their professional experience outside the field.

The various branches of the engineering profession have between 1.6 and 18.3 percent of their members engaged in research activities. Therefore sanitary engineering, with only 1.9 percent of its personnel doing research, ranks low in this respect.

The four leading types of activity are public health, designing, consulting, and municipal. About 80 percent of all sanitary engineers are in some way connected with water and sewage programs.

The data on the characteristics of the sanitary engineering profession are given in the form of tables, charts, and other graphic devices. Age, numbers, education, types of degrees, activities, and professional area are covered by these statistics which are presented in individual tables or correlated in various combinations.

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Lyon, Walter A., and Miller, Arthur P.: *The Composition of the Sanitary Engineering Profession*. (Scientific Manpower Series No. 2, Office of Education, Federal Security Agency) 1952. 36 pages; tables; charts. 15 cents. A limited number of copies are available

upon request to the Division of Engineering Resources, Public Health Service, Washington 25, D. C.

Cancer Morbidity Series

Cancer illness among the residents of Birmingham, Ala., and Detroit, Mich., is covered in publications 8 and 9 in the Cancer Morbidity Series. Both cities showed an increase in cancer incidence in the past 10 years, according to the reports.

In the Birmingham area the incidence rate during 1948 was 71 percent greater than in 1938 and the mortality rate was 24 percent greater. The incidence increase in Detroit in the 10-year period was 59 percent. These increases in incidence may have been due in part to better reporting by physicians, improvements in diagnostic and case-finding methods, and aging of the population.

The Birmingham survey showed that of all the cancer cases diagnosed when the disease was localized, 87 percent survived 12 months. In cases not discovered until regional involvement had taken place, 66 percent survived 12 months, and in cases not diagnosed until remote metastasis had occurred, only 33 percent survived a year.

Similarly, in Detroit, 78 percent of cases of early diagnosed cancer, 54 percent of those discovered after regional involvement, and only 22 percent of cases diagnosed after remote metastasis survived 1 year.

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Cancer Illness Among Residents of Birmingham, Ala. Cancer Morbidity Series No. 8. (Public Health Service Publication No. 216) 1952. 49 pages; tables, charts.

Cancer Illness Among Residents of Detroit, Mich. Cancer Morbidity Series No. 9. (Public Health Service Publication No. 217) 1952. 48 pages; tables, charts.

Single copies of these publications may be obtained from the National Cancer Institute, Public Health Service, Bethesda, 14, Md.

Office of Defense Mobilization Pamphlets

Maintaining the worker's health and the employability of women, the elderly, and the disabled are subjects covered in four Office of Defense Mobilization pamphlets.

"The Worker and His Health" estimates sickness absenteeism in industry to be 400-500 million man-days a year, an equivalent of almost 2 million men absent from their jobs for a year. More than 90 percent of the illnesses have nonoccupational causes. Experience in plants, the pamphlet states, has shown that in-plant health services can reduce losses from sickness absenteeism by one-third to one-half. The value of in-plant health programs is stressed, and steps for their development are suggested. Local health departments, medical and dental societies, visiting nurse associations, employer associations, labor organizations, and other firms with in-plant health services are referred to as the best sources from which to obtain information on how to initiate an in-plant health program.

Women, and handicapped and older workers have production and safety records as good as or better than other workers, the pamphlets, "A Job for Women," "The Disabled Can Work," and "Production at Any Age," claim. Increasing numbers of women are finding employment in industry. The Bureau of the Census estimates that 19 million women, or 30 percent of all workers, are in the civilian labor force today.

"A Job for Women" outlines the importance of matching the woman worker's physical, mental, and emotional capacity against the demands of the job to assure successful placement.

"The Disabled Can Work" states that through rehabilitation many physical and mental handicaps can be eliminated or reduced to enable

workers with disabilities to meet demands of selected jobs. When the disability is properly treated, the person trained for and placed in the right job can meet the requirements as well as anyone. Advances in medical knowledge, improvements in prosthetic devices, development of specialized rehabilitation centers, and the establishment of vocational rehabilitation and placement programs have made it possible for thousands of disabled men and women to resume active lives and enter the labor force as self-supporting citizens. The plant medical department plays an important part in aiding the placement of the handicapped worker.

"Production at Any Age" cites the older person's need of productive activity with pay checks. Industry, the community, and the Nation have a stake in the usefulness and economic productivity of older workers, the pamphlet states in emphasizing the necessity of breaking down current prejudices against hiring this group. Industry can help provide much needed information for proper placement of older workers through careful study of job requirements, conditions of entry, and the productivity of older workers. In-plant health services can also contribute much to the health and productivity of the older worker, through periodic physical examinations and other preventive services. Similarly, benefits would accrue to all the workers from the preventive services of such in-plant health plans.

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The Worker and His Health. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C., 1952. 8 pages; illustrated; references.

A Job for Women. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C., 1952. 8 pages; illustrated; references.

The Disabled Can Work. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C., 1952. 7 pages; illustrated; references.

Production at Any Age. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C. 7 pages; illustrated; references.

Copies of these publications are available upon request to the Division of Occupational Health, Public Health Service, Washington 25, D. C.

Clean Water Pamphlets

"Till taught by pain men really know not what good water's worth." This quotation from Lord Byron prefaces each of four pamphlets which deal in a personalized way with the pollution problem in its respective river basin area.

Based upon the longer technical reports of the cooperative State-Federal drainage basin surveys, the pamphlets present the story of pollution in terms of the interests of the people in each area. They describe the cities which are situated along the rivers, their industries, and what each is contributing to the pollution problem in terms of dangers to health, agriculture, recreation. The pamphlets tell what the cities are doing about the pollution problems—which are and which are not treating their sewage. And finally they tell what the people must do to correct the problem.

These four pamphlets are part of a group of 15 that are being prepared in connection with the longer drainage basin surveys.

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Clean Water for the Pacific Northwest. (Public Health Service Publication No. 201) 1952. 6 pages; illustrated. 5 cents.

From the Hudson to the Potomac: Clean Waters. (Public Health Service Publication No. 202) 1952. 6 pages; illustrated. 5 cents.

Cleaner Water for the Ohio. (Public Health Service Publication No. 203) 1952. 6 pages; illustrated. 5 cents.

Clean Water for New England. (Public Health Service Publication No. 199) 1952. 6 pages; illustrated. 5 cents.

Keeping Our Hospitals Operating— A Study of Supply and Equipment Requirements

Results have now been published of the study undertaken by the American Hospital Association and the Public Health Service to determine the maintenance, repair, and operating (MRO) requirements for civilian hospital equipment and supplies.

The operating workload of the survey was carried principally by the Divisions of Civilian Health Requirements and Hospital Facilities of the Public Health Service. Survey questionnaires were mailed to all continental United States non-Federal hospitals of 15-bed size or larger that were on the American Hospital Association's mailing list, including nonmembers. Presented in the report are the estimated requirements for 585 hospital items, based on replies from over 2,600 hospitals of every type and size throughout the country. The number of hospitals which returned replies represents about 55 percent of the hospitals queried. Long-life items are reported in terms of national 5-year requirements; short-life items in terms of national 1-year requirements. A detailed breakdown of the survey data is included for further use by researchers in this field. The survey is the most comprehensive ever undertaken to determine what equipment and supplies are required by hospitals.

During a period of mobilization, accurate knowledge of essential civilian needs is necessary for making proper decisions and allocations respecting any segment of our economy, the report notes. Hospital specialists, who had personal experience with allocations during World War II, favored the study, because of the handicaps that they previously had encountered.

In summarizing the survey, the introductory section of the report cites the uses of the estimates as follows:

1. By agencies of the Government—in preparing and analyzing

proportionate civilian and military hospital requirements in this field.

2. By distribution agencies—as a factor in distributing critical materials.

3. By hospital administrators—in conducting intensive studies of institutional operation.

4. By the manufacturing industry—as a factor in considering adequacy of productive capacity.

5. By the combined manufacturing and distributive industries—in designing distribution operations.

The MRO study of hospital equipment and supplies is a part of the overall surveillance of supply-and-demand relationships with respect to health material that is being conducted by the Public Health Service.

Keeping Our Hospitals Operating. A study of supply and equipment requirements. (Public Health Service Publication No. 272) 1953. 191 pages; tables. 45 cents.

Community-Wide Installation of Household Garbage-Grinders

This is a joint publication of the Indiana State Board of Health and the Public Health Service prepared in answer to many requests from city governments, sanitary engineers, and the plumbing industry for information on the results of the Jasper, Ind., experiment. In December 1949, Jasper became the first municipality to undertake the elimination of garbage collection through the installation of home garbage-grinders. The project was begun after an epidemic of hog cholera resulted in the refusal of contractors to collect Jasper's garbage. In the 18-month period of this study 900 household garbage-grinders were installed, servicing 75 percent of the population.

The report is preliminary, since the restaurants and food service establishments have not as yet installed garbage-grinders. In addition to background information on the development of the project it discusses the effect on the sewerage system, water consumption, refuse

collection and disposal, fly densities and rodent infestation.

Erganian, George K., Belter, Walter G., Graber, Ralph, C.: Community-Wide Installation of Household Garbage-Grinders. (Public Health Service Publication No. 224) 1952. 41 pages; illustrations, tables, charts. 20 cents.

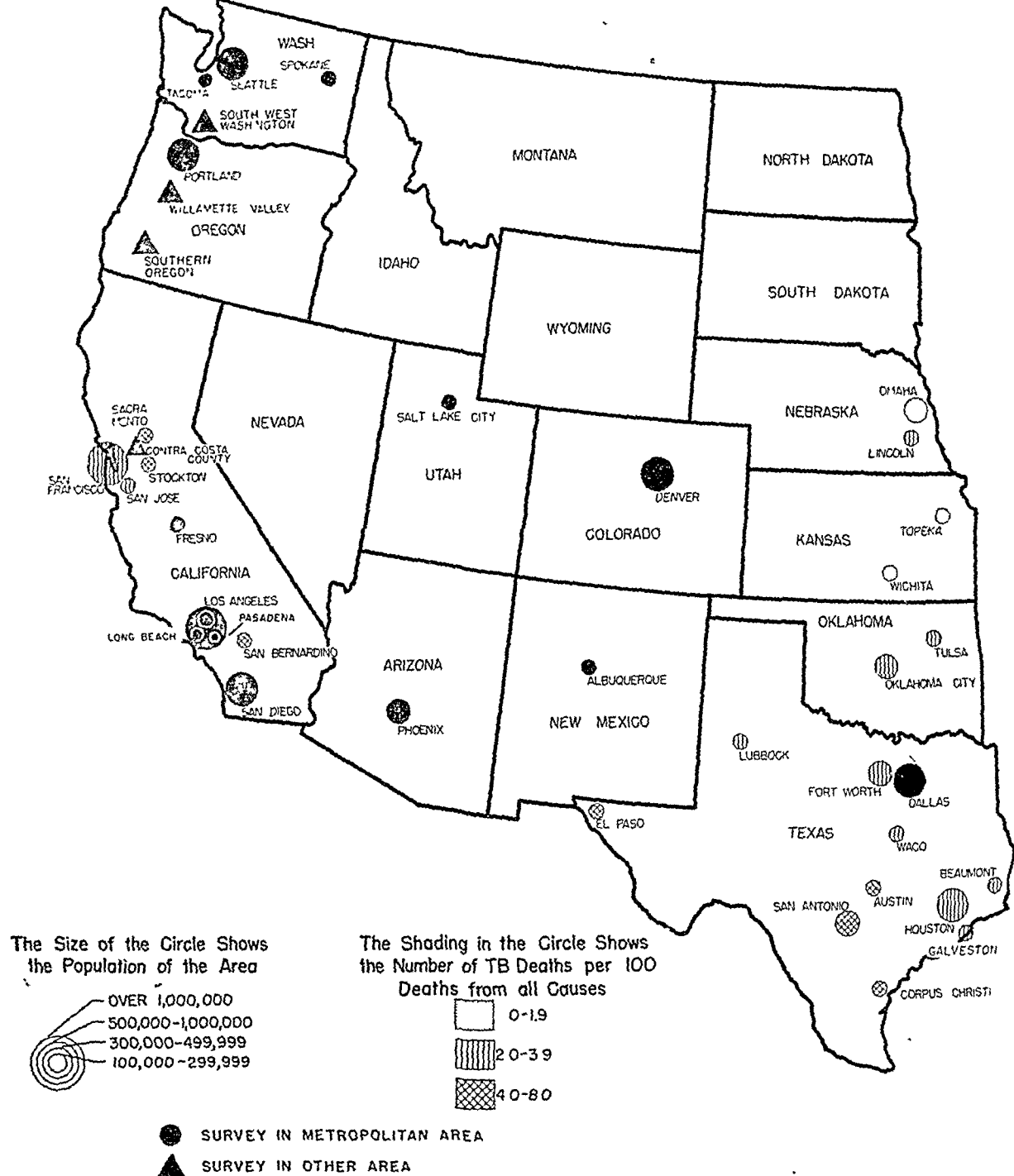
The Sanitary Landfill in Northern States

In 1948 the North Dakota State Department of Health invited the Public Health Service to participate in a study of the use of landfill techniques to provide a sanitary solution to the refuse disposal problem in cold climates. The city of Mandan, North Dakota, was selected for the study, which began in 1949.

A report of the Mandan project appeared in the March 1952 issue of *Public Health Reports*. This publication presents a more detailed and technical discussion of the experiment including the selection of the first and second sites, plans of operation, and details of construction of the landfill. An outline for a small community operation is given with information on temperature studies, physical and chemical analyses, and a tabulation of operational costs for a 1-year period.

Weaver, Leo, and Keagy, Donald M.: The Sanitary Landfill in Northern States. (Public Health Service Publication No. 226) 1952. 31 pages; illustrated, tables, charts. 20 cents.

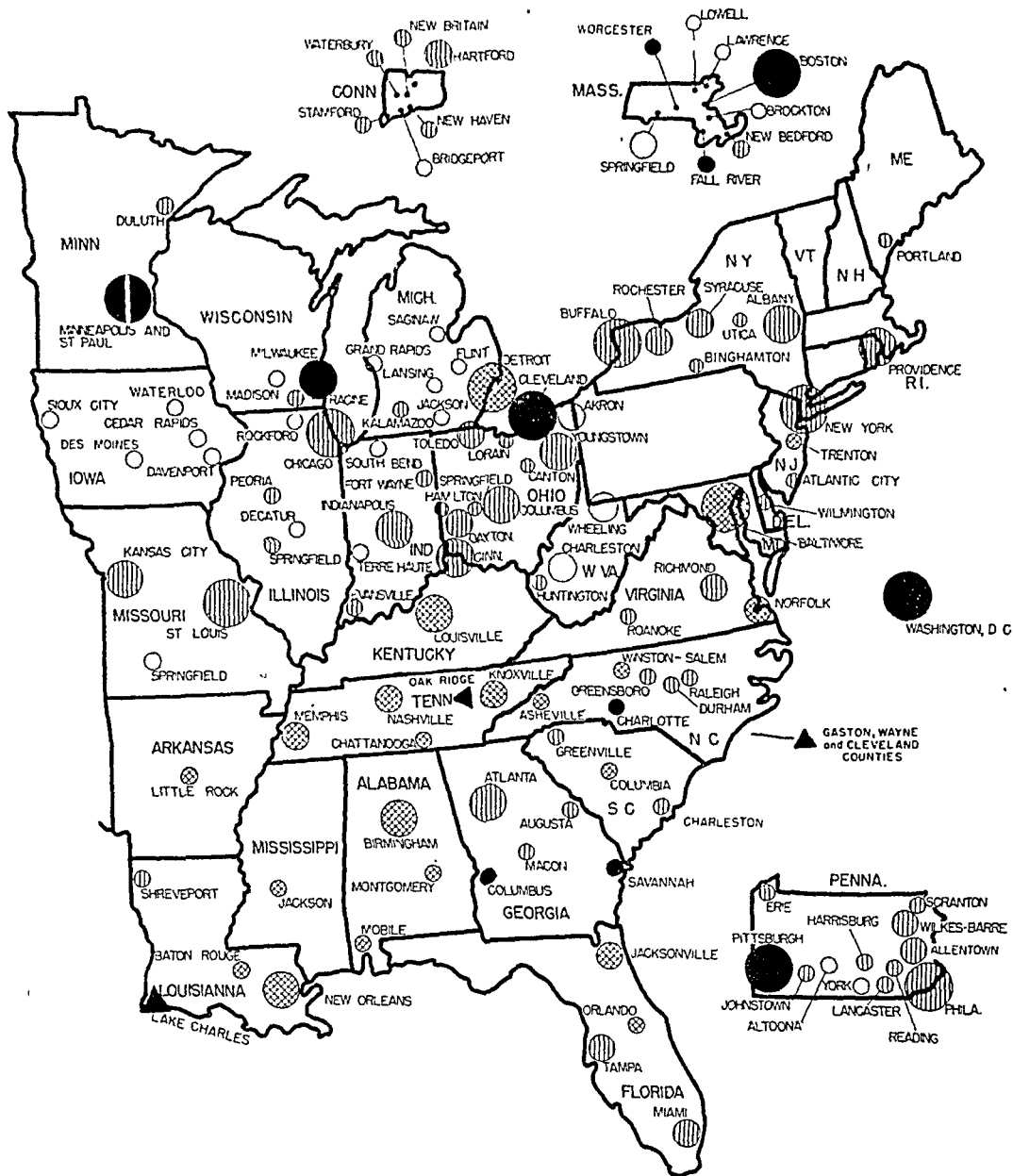
Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.



Community-wide X-ray Surveys, 1945-1953,

Large cities in the United States have the highest tuberculosis death rates, but because of their very size they present unusual difficulties to health department case-finding activities. To help metropolitan areas carry out chest X-ray surveys quickly and effectively, the Pub-

lic Health Service, on request, provides X-ray machines and technicians. Public Health Service physicians read the films, and consultation is given by Service physicians, nurses, medical social workers, health educators, and records specialists.



conducted with Public Health Service Assistance

Since October 1945, the health officers of 31 areas have requested and received this service. These areas, 24 defined by the Bureau of the Census as "metropolitan" (over 100,000 population) and 7 other densely populated places, are indicated on the accompanying map by solid

symbols. Also shown on the map are the size and the proportionate tuberculosis mortality of the other metropolitan areas over 100,000 population. The table on the following page summarizes key findings.

Thirty-one community-wide X-ray surveys, 1945-53

Location of survey	Total screening films taken by team	Index of coverage ¹	Screening film readings				
			Total satisfactory films	Suspected abnormal findings			
				Total	Tuberculosis	Other chest disease	Cardio-vascular disease
Savannah, Ga.....	74, 311	65. 5	67, 961	1, 220	755	465	(?)
Columbus, Ga.....	53, 144	74. 6	52, 093	2, 618	1, 422	1, 196	(?)
Gaston, Wayne and Cleveland Counties, N. C.....	113, 422	83. 1	110, 236	1, 980	1, 222	758	(?)
Milwaukee, Wis.....	181, 263	38. 2	176, 469	4, 333	2, 805	971	577
Minneapolis, Minn.....	306, 020	75. 2	301, 513	10, 238	5, 977	3, 403	858
Oak Ridge, Tenn.....	13, 537	38. 4	13, 421	992	536	456	(?)
St. Paul, Minn.....	129, 401	55. 4	125, 853	4, 417	2, 197	1, 161	1, 059
Washington, D. C.....	454, 130	64. 2	439, 927	21, 858	12, 464	4, 862	4, 532
Seattle metropolitan area, Wash.....	375, 933	65. 9	367, 732	14, 331	8, 372	3, 495	2, 464
Tacoma metropolitan area, Wash.....	73, 197	67. 5	72, 703	1, 462	951	383	128
Cleveland metropolitan area, Ohio.....	684, 763	64. 4	673, 115	15, 998	8, 125	3, 447	4, 426
Spokane metropolitan area, Wash.....	106, 962	89. 2	106, 526	2, 813	1, 591	749	473
Denver metropolitan area, Colo.....	326, 326	80. 1	324, 096	10, 646	7, 312	1, 826	1, 508
Boston, Mass.....	536, 012	86. 3	528, 941	14, 442	8, 060	3, 067	3, 315
Salt Lake City metropolitan area, Utah.....	162, 854	93. 1	162, 351	4, 124	1, 544	1, 204	1, 376
San Diego metropolitan area, Calif.....	239, 585	81. 9	238, 557	8, 547	4, 643	2, 359	1, 545
Los Angeles and Los Angeles County, Calif.....	1, 755, 001	55. 6	1,736,703	67, 966	44, 328	13, 125	10, 513
Contra Costa County (Richmond), Calif.....	124, 118	57. 8	121, 434	5, 168	2, 968	1, 436	761
Phoenix metropolitan area, Ariz.....	176, 964	76. 2	175, 724	12, 724	9, 851	1, 650	1, 223
Albuquerque metropolitan area, N. Mex.....	77, 329	75. 9	77, 082	3, 849	2, 754	727	368
Willamette Valley, Oreg.....	237, 229	64. 0	234, 809	7, 415	4, 222	2, 846	347
Vancouver and 4 counties, Wash.....	75, 073	72. 6	74, 415	3, 092	1, 522	1, 282	288
Southern Oregon.....	66, 630	66. 7	66, 147	2, 556	1, 305	1, 001	250
Portland and Multnomah County, Oreg.....	237, 970	64. 4	234, 723	10, 439	4, 914	3, 819	1, 706
Dallas metropolitan area, Tex.....	271, 852	62. 5	269, 845	9, 260	5, 127	3, 004	1, 129
Worcester and 10 towns, Mass.....	153, 510	82. 3	152, 260	5, 263	2, 599	2, 262	402
Fall River, Mass.....	31, 548	37. 3	31, 327	1, 154	563	427	164
Lake Charles and 2 parishes, La.....	54, 305	81. 1	54, 130	1, 277	734	359	184
Fresno metropolitan area, Calif.....	165, 730	85. 2	(?)				
Charlotte metropolitan area, N. C.....	106, 821	75. 4	(?)				
Pittsburgh and Allegheny County, Pa.....	(?)						
Total.....	47, 364, 940	64. 9	6,990,093	250, 182	148, 863	61, 740	39, 579
Percentages.....			100. 0	3. 6	2. 1	0. 9	0. 6

¹X-rays taken as percentage of population 15 years of age and over. ²Suspected cardiovascular findings are included in suspected other chest disease findings. The totals for each of these columns are therefore over- and under-stated, respectively. ³Final report not yet received, survey in operation at time of publication. ⁴In addition, over 500,000 X-rays were taken during this period in limited resurveys in Washington, D. C., and Cleveland, Ohio; in case finding surveys among migrant workers; and in other areas to which only photofluorographic equipment and technicians were supplied.

This report was prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.

Medical Education Scholarship Loans in the Mississippi Integrated Health Program

By FELIX J. UNDERWOOD, M.D.

THERE ARE years in the life of a State, just as in the life of an individual, that mark a kind of coming of age. Such a year in the history of Mississippi was 1946. At that time nearly half a century of work on medical, hospital, and nursing problems culminated, and new surveys, studies, and plans were made that launched the State on a new medical era.

Among the programs inaugurated in 1946 was the medical education scholarship loan program, which is helping to meet one of Mississippi's greatest medical needs—that for general practitioners in rural areas. By January 1, 1953, 120 physicians who had been granted loans under the program were in practice in the State, representing almost one-third of the total increase in physicians since 1946. An additional 15 loan recipients were in the Armed Forces, and another 52 were serving their internships.

Background of the Integrated Program

Mississippi is a rural State, with 70 percent of its people living in rural areas and securing

Dr. Underwood, executive officer of the Mississippi State Board of Health since 1924, is a member of the Mississippi State Medical Education Board. His career in public health and medicine has included the presidencies of the Southern Medical Association (1931), the State and Provincial Health Authorities (1939), and the American Public Health Association (1944).

their incomes from farm production, and, although there is some trend toward urbanization, it can be expected to be one for some time to come. In a rural State personal income can be expected to be less than that in more urban States, and the population can be expected to be scattered rather than concentrated. Thus, the large cash outlays necessary for a medical education are frequently not available from family funds, and the scattered, isolated population creates special problems in providing adequate medical care.

In 1946, Mississippi was suffering along with the rest of the Nation from 5 years of war and 10 years of depression, which had left both material and personnel problems in medical care. Few hospitals, health departments, or clinics had been built; few doctors, nurses, or other medical personnel, trained. Inquiries and surveys by the Mississippi State Board of Health and other agencies interested in the medical problems of the State, including the State medical society, the business research station at Mississippi State College, and the Farm Bureau Federation, revealed the following conditions:

Physicians. The number of physicians in the State had decreased each year since 1909, from 2,054 in that year to 1,112 in 1946, while the population of the State had increased from 1,790,000 to 2,186,000. Actually, only 915 physicians were actively practicing in 1946. The number of persons per physician had increased from 871 in 1909 to 1,966 in 1946, whereas the national average had remained around 700 dur-

ing the entire period. More than half of the physicians licensed to practice in the State were over 60 years old; only 139 were less than 40 years old.

Medical and Nursing Education. The 2-year medical school at the Mississippi State University could accept only 25 students each year; it had been compelled to reject 102 qualified applicants in the 4 preceding years. There was no college-level nursing education available for training nurses for teaching or other positions of leadership and responsibility.

Hospitals. Of the 114 hospitals in the State, only 5 were as large as 100 beds, and no general internships or residencies were available. Only 2,988 of the 4,200 beds in the general hospitals were of acceptable quality according to standards for safety, compared with a need of 7,594. The ratio of beds per thousand persons was 1.6, compared with a need of 4.5.

Health Department Facilities. There were only 12 adequate health department buildings, compared with a need for at least 70. (There are 82 counties, but several counties are in districts so that one main office serves several counties.)

Hospitalization Insurance. No statewide voluntary, nonprofit hospitalization insurance was available.

The State board of health, the State medical society, the Farm Bureau Federation, and others carried these facts to the people by personal visits and talks in almost every county. By newspaper and radio articles, by pamphlets and leaflets, the campaign went forward.

Legislative Action

These facts were also presented to the State legislature when it met in 1946, and a number of legislative committees went to work on plans to improve the situation. As a result, the legislature passed laws which (a) created the Mississippi State Medical Education Board, with sufficient funds for 2 years' operation, to grant and supervise medical scholarships; (b) created the Commission on Hospital Care to plan and direct the construction of hospitals and health centers; (c) provided for the construction of a 4-year medical school to be undertaken as soon as the rural hospital construction program

should reach a late stage of completion; (d) directed the Commission on Hospital Care to make a study of nursing needs and to plan a State program of nursing education; and (e) directed the Commission on Hospital Care to establish a statewide program of voluntary hospitalization insurance.

This was the broad outline of the integrated program to improve medical care in Mississippi. The medical education scholarship loan program, an important segment of the overall program, will be discussed in detail.

Operation of the Program

The State medical education board, which administers the scholarship loan program, is composed of five members: the dean of the University of Mississippi Medical School, the executive officer of the State board of health, the president of the State medical society, and two members appointed by the Governor for 4-year terms. It reviews applications, awards the scholarships, and approves the scholarship physician's location for practice.

A loan made through this program may not exceed \$1,250 a year for expenses, including tuition, payable direct to the medical school, or \$5,000 for 4 years. Veterans receiving aid under the GI bill of rights are eligible for loans of \$500 to \$1,000 per year payable direct to the students themselves.

To be eligible for a loan, an applicant may be either white or Negro, male or female, and must meet the following qualifications:

1. Be a resident of Mississippi.
2. Be in need of funds to complete his medical education.
3. Have completed his premedical work and be acceptable for enrollment in a class A medical school.
4. Agree to sign a contract with the State to return to Mississippi after graduation and 1-year internship (under exceptional conditions, 2-year internship may be permitted) to engage in the practice of medicine in a rural area approved by the board for a minimum of 2 years, regardless of the amount of the loan. If the scholarship physician elects to remain in the approved area for 5 years, the entire loan plus

interest is canceled at the rate of one-fifth for each year. Should he elect to repay the balance of his loan with interest at the end of 2 years, he may do so.

By the end of 1947, after the program had been in operation a year, 73 students, selected from 400 applicants, had been awarded scholarships. Applications had been received from persons in 79 of the 82 counties in Mississippi. The students were to attend 14 medical schools in the United States, including the 2-year medical school of the State university. Forty-two of these awards went to veterans of World War II; 7 went to women and 8 to Negroes.

The board's report to the legislature at the end of 1948 specified that 164 scholarships had been thus far awarded. This figure may be compared with the total of 48 awards which had been made by that time in the 8 other States having some kind of medical scholarship program in effect—Alabama, Georgia, Illinois, Indiana, Kentucky, North Carolina, South Carolina, Virginia. The Mississippi plan had produced 3 practicing physicians; the 8 other States had produced 1.

Accomplishments of the program by January 1, 1953, may be summarized as follows:

Scholarships awarded.....	406
Men, white.....	362
Men, Negro.....	30
Women, white.....	14
Medical graduates.....	195
Scholarship physicians now in practice in State.....	120
Scholarship physicians in the Armed Forces..	15
Graduates serving internships.....	52
Physicians who served minimum of 2 years and repaid loan in cash.....	5
Physicians who died before fulfilling 5-year contract.....	3
Students who failed in medical studies and repaid loan in cash.....	2
Students still in school.....	209

The 120 scholarship physicians now in practice in the State are located in 77 towns in 52 of the 82 counties. This fact gives some idea of the wide distribution of these physicians.

Problems of the Program

Most of the problems which have arisen in connection with the scholarship program have been those of routine administration common

to the handling of substantial sums of money and the selecting of the most apt and promising candidates from hundreds of applicants.

There has been some misunderstanding on the part of the students as to the objectives of the program. Some students have felt that the board should allow completion of residencies which would qualify them for practice in such specialties as surgery, gynecology, obstetrics, or eye, ear, nose, and throat. One or two medical schools have also criticized the board's policy of restricting postgraduate training to general internship. The board feels, however, that the objective of the program is to increase the supply of general practitioners, which are so badly needed in the rural areas, and not the training of specialists. The board also feels that even if a physician intends to specialize at some time in his life, it is a sound and desirable procedure for him to spend as much as 5 years in general practice prior to specialization.

Two of the scholarship recipients failed in their medical studies, but they represent such a low percentage of those receiving scholarships (0.6 percent) that this is not considered a serious problem.

The death of three of the scholarship recipients before completion of their contract to practice presents a more serious problem. Perhaps more effective health examinations for applicants should be given consideration. One of the deaths, however, occurred in a young physician who 8 months after entering practice contracted poliomyelitis of the fulminating type; no way is known to have prevented this death.

Opportunities for the Student

The scholarship program offers the opportunity for qualified persons in Mississippi who are interested in becoming rural physicians but who are unable to finance a medical education to reach their goal without incurring debts which must be repaid in cash. It should be noted that the per capita income for Mississippi is only half as large as that for the Nation as a whole, \$700 as compared with \$1,400 in 1950. The program makes it possible for the student to make a plan for his medical education and for the first 5 years of practice with reasonable

assurance that he can carry out his plan, thus relieving him of many worries and giving him freedom to concentrate on his studies.

The student under this program also has the advantage of the guidance services of the medical education board, who can offer the student much information about the professional problems of preparing for medical practice and, concerning desirable locations for practice in the State. Much of this information comes from the State medical society, the American Medical Association, the State board of health, and other agencies. The scholarship medical student is supplied with monthly reports on the general economic status of the State and of each of 14 specific subdivisions of the State. This information is furnished by the business research station of Mississippi State College, chambers of commerce, and local physicians and residents of various parts of the State.

Although a scholarship recipient is somewhat restricted as to postgraduate training and location for practice, he is free to attend any class A medical school in the United States and his first choice of location for practice is approved if it is within the provisions of the law and in keeping with the objectives of the program. Furthermore, he is not prevented from specializing nor from practicing in any location he may choose after 2 years, if he wishes to repay the balance of the loan in cash, or after 5 years, debt free.

Advantages to the State

One of the chief advantages of this program to the State is the opportunity it provides for influencing physicians to render medical service where the service is most needed. The board accomplishes this objective primarily by its approval of the scholarship physician's location for practice, but, to some extent, also by its selection of applicants. There is some advantage, for example, in securing at least a portion of the medical students from small towns and rural areas, since it has been found that physicians reared in such areas are generally better adapted to practice there.

The program also gives the State an opportunity to influence medical students to become the type of physician most needed, and gives

it some measure of control over the supply of new physicians. Since the scholarship program has provided almost one-third of the increase in number of physicians in the State since its inception, an increase or decrease in the number of scholarships awarded should have a significant effect upon the number of new physicians.

Finally, the program supplements the 4-year medical-school program, giving the school an opportunity to serve Mississippi students who otherwise would be unable to finance a medical education.

Six Years of Medical Progress

The 6 years since the integrated program for improving medical care was begun have brought progress in all the fields of endeavor. The achievements may be summarized as follows:

Physicians. The supply of physicians in the State is on the increase for the first time since 1909. The number has risen from 1,112 in 1946 to 1,500 in 1953.

Medical and Nursing Education. A 4-year medical school, which will be a part of the State university, is under construction in Jackson. It will accommodate 400 medical students and 100 nursing students. As a part of this project, a teaching hospital of 350 beds is also under construction. A nursing school of college grade has already been established at the university and is completing its fourth year of successful operation. Although it is the only school of college grade for nurses in the State, it is ample to meet all needs for this class of nurses. Upon completion of the medical school in Jackson, the nursing school will be transferred there. Three schools for practical nurses, one of which is for Negroes, have been established and are furnishing well-trained practical nurses for the first time in the State's history.

Hospitals. Thirty-eight new hospitals have been constructed and equipped and are in operation; five more are under construction. Although several hospitals have been condemned and abandoned as unsafe, the number has increased from 114 in 1946 to 141 in 1953. A total of 2,258 hospital beds have been added and 895 more are under construction. Although 195 beds were lost in abandoned hospitals, the number has risen from 4,200 in 1946 to 6,273 in 1953.

Hospitalization Insurance. A statewide program of voluntary hospitalization and surgical insurance (Blue Cross and Blue Shield) was established in 1948 and is now the fastest growing State plan in the United States. It has a membership of 250,000.

Mississippi does not claim that this progress has been made by its efforts alone. Counsel and advice have been obtained from medical leaders all over the United States. Federal funds for hospital construction, provided under the Hospital Survey and Construction (Hill-Burton) Act, have been a welcome addition to State,

local, and private funds. All the costs of the medical education scholarship loan program, the various nursing education programs, the hospital and surgical insurance program, and the 4-year medical school project, and more than one-half of all hospital and health department construction costs, however, have been paid with State, local, and private funds.

Mississippi feels that it can indeed be proud of this outburst of medical progress, for it was long in the humble position of one who recognized its needs but whose utmost efforts were unavailing to meet them.

Public Health Service Staff Announcements

Dr. Martin D. Young, scientist-director of the Public Health Service Laboratory of Tropical Diseases, Columbia, S. C., was among the first 11 persons to win a Rockefeller public service award, it was announced in February. The award was granted for outstanding research work in tropical diseases. It will enable Dr. Young to conduct further research in this field through a 9-months' inspection tour of tropical disease centers in Europe and Asia. Dr. Young joined the Public Health Service and the laboratory staff in 1937, and became director of the laboratory in 1941.

Dr. G. Milton Shy has been appointed chief of clinical research of the National Institute of Neurological Diseases and Blindness of the Public Health Service. Dr. Shy will be responsible for the planning and guidance of clinical research into the neurological and sensory disorders, among them multiple sclerosis, cerebral palsy, epilepsy, cataracts, and glaucoma. For these clinical studies, the Institute has been allocated 42 beds and 19 laboratories in the new Clinical Center at Bethesda, Md.

Prior to his appointment, Dr. Shy was chief of the neurological service at the Colorado Medical School and was a consulting neurologist at several Colorado hospitals.

Dr. Shy received his M.D. from the University of Oregon Medical School in Portland and received his special neurological training at Queen Square, London, and at

the Montreal Neurological Institute, Quebec.

Dr. James K. Shafer and Dr. Clarence A. Smith were appointed chief and assistant chief, respectively, of the Division of Venereal Disease, Public Health Service, in March 1953, by Surgeon General Leonard A. Scheele.

Dr. Shafer succeeds Dr. Theodore J. Bauer who now heads the Communicable Disease Center of the Public Health Service at Atlanta. As the new assistant chief, Dr. Smith assumes the post to which Dr. Shafer was appointed in 1950.

A veteran of 14 years' service in the commissioned officers corps of the Public Health Service, Dr. Shafer has served as venereal disease control officer in the health departments of Chicago and Moline, Ill., and Wayne County, Mich. He also served as Public Health Service consultant in the Chicago regional office.

Preceding his new appointment, Dr. Smith was venereal disease control officer for Chicago. A Public Health Service commissioned officer since 1937, he has served as medical officer in charge of the Southeastern Medical Center, Savannah, and of the Michigan Rapid Treatment Center, Ann Arbor, and has seen duty in Alabama's and South Carolina's venereal disease control programs. Dr. Smith was assistant professor of tropical medicine and public health at Tulane University School of Medicine from 1948 to 1950.

Time Between Tuberculosis Reporting And Death

By EDWARD X. MIKOL, M.D., M.P.H., and BEN Z. LOCKE, M.S.

THE REPORTING of tuberculosis cases to health departments is one of the most important administrative procedures in tuberculosis control. Such reporting identifies the person who is in need of medical and public health supervision. It results in getting him registered for such supervision and keeps him so until death, cure, transfer, or other reason for discontinuation of supervision. Each newly reported case is a new source for contact investigations leading to the possible discovery of other new cases, and reporting provides valuable statistics for the study of tuberculosis morbidity.

It has long been known that a substantial proportion of persons who die from tuberculosis have never been reported as cases before death. Each such death represents a person who either was not found as a case during life or at least failed to be reported officially as a case. Since reporting is the event which, generally speaking, puts the public health machinery into action for a given case and possible associated cases, such nonreporting signifies lack of opportunity for care and supervision by official agencies and for fulfillment of all the other purposes of reporting.

This is a report of a partial study over a period of years of tuberculosis deaths unreported as cases in New York State, exclusive of

New York City. The "unreported deaths" consist of cases reported on the same day as the date of death, cases reported after death, and deaths never reported as cases. The study was partial in that only certain information from death certificates was analyzed. A complete study would necessarily include a detailed field investigation of many factors pertaining to each unreported death, with perhaps a similar investigation, as a control, of deaths previously reported as cases.

The purpose of the study was to analyze some of the characteristics of the unreported deaths and particularly to determine, if possible, whether there might be some extenuating factors to account for the nonreporting as had been suggested by some earlier observations.

Frequency of Unreported Deaths

Table 1 shows the distribution of tuberculosis deaths according to the time of reporting as cases for two 5-year periods (annual average for 1940-44 and for 1945-49) and for 1951. The fourth column shows that slightly over 20 percent of the total deaths were never previously reported as cases before death; for example, during the period 1945-49, out of an annual average of 1,761 total tuberculosis deaths, 398 or 22.6 percent were unreported deaths.

Information is not readily available as to how this figure of a little over 20 percent for upstate New York compares with other States. (This figure should not be confused, of course, with the percentage of the total reported cases in a given year which are first "reported" by

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death certificate. In upstate New York the latter figure was 9 percent in 1940 and 5 percent in 1951.)

Table 1 shows also the number and percentage of deaths which were reported before death, divided into four "time" groups. It is encouraging that the percentage reported less than 3 months before death decreased during the period from 16.7 in 1940-44 to 10.1 (sixth column) in 1951; at the same time, the percentage reported 12 months or more before death increased from 46.0 to a peak of 56.2.

In considering the significance of the unreported deaths, the third column of table 1 shows that the number has decreased substantially from an average of 451 deaths during 1940-44 to a low of 235 in 1951. However, the percentage of unreported deaths in relation to the total deaths has shown little change since at least 1940; the annual fluctuation has been only from a high of 23.7 to a low of 20.6. This slight variance occurred during a period when there was a great expansion and improvement in case-finding techniques. It is one of the observations which has raised the question as to whether at least some of the nonreporting during life may be due to some "uncontrollable" factors.

Characteristics of Unreported Deaths

Certain characteristics of the unreported deaths for the three representative periods were analyzed.

Sex and Age

There is apparently no difference in the proportion of unreported deaths in the two sexes.

In each sex group there is a higher proportion of the unreported deaths in the age group 65 or over than would be expected by chance alone.

Place of Death

There is no difference in the proportion of unreported deaths in cities with populations of 50,000 or more as compared with the rest of the area. Table 2 shows the distribution of unreported and reported deaths in 1951 in relation to the place of death within urban and rural areas. The striking fact is that out of 194 tuberculosis deaths in general hospitals, 111, or 57 percent, were not reported before death, as compared to the 21 percent total unreported, to the 9 percent in tuberculosis hospitals (includes general hospitals with separate tuberculosis buildings or services), the 21 percent in other institutions, and the 22 percent in private dwellings. Stated another way, general hospitals contributed only 17 percent of all the deaths (194 out of 1,134), whereas they account for 47 percent of the total unreported deaths (111 out of 235).

This could mean that general hospitals are lax in reporting tuberculosis cases; perhaps this is due in some instances to failure to assign specific responsibility for official case reports. Also, it may be assumed that for the most part, patients admitted to general hospitals are more likely to have the acute types of disease, including pulmonary tuberculosis, with a diagnosis of tuberculosis being made only a short time before death.

Regardless of the explanation, this finding provides eloquent additional evidence for the

Table 1. Tuberculosis deaths in relation to time of reporting as cases, New York State, exclusive of New York City, 1940-44, 1945-49, and 1951

Year	Total deaths		Not reported before death		Reported before death							
					Less than 3 months		3 to 6 months		6 to 12 months		12 months or more	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1940-44 ¹ ---	2,024	100.0	451	22.3	338	16.7	132	6.5	172	8.5	931	46.0
1945-49 ¹ ---	1,761	100.0	398	22.6	264	15.0	104	5.9	140	8.0	855	48.6
1951-----	1,134	100.0	235	20.7	114	10.1	63	5.6	84	7.4	638	56.2

¹ Annual average.

Table 2. Tuberculosis deaths according to place of death and time of reporting as cases, New York State, exclusive of New York City, 1951

Place of death	Total deaths		Not reported before death		Reported before death	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent
Total.....	1,134	100	235	21	899	79
Tuberculosis hospi-tals.....	654	100	62	9	592	91
General hospitals.....	194	100	111	57	83	43
Other institutions.....	105	100	22	21	83	79
Private dwellings.....	181	100	40	22	141	78

need of extending to all general hospitals the program of routine chest X-ray examinations of all patients admitted. Also, cases of tuberculosis should be promptly reported in order that the necessary examinations of the family-household contacts may be made.

With reference to deaths in private dwellings, the percentage of unreported deaths, 22 percent, was about the same as the total of 21 percent for all places; moreover, it is significant that only 40, or 17 percent, of the total 235 unreported deaths occurred in private dwellings.

Site of Disease

Of the total 1,134 tuberculosis deaths in 1951, 44, or 4 percent, were due to tuberculosis of the meninges or to acute disseminated tuberculosis; 25 of these were unreported before death and 19 were reported. The 25 unreported deaths represent 11 percent of the total 235 unreported deaths, whereas the 19 reported are but 2 percent of the total 899 which were reported. This then is another group of deaths the nonreporting of which may be accounted for by the acuteness of disease and the usually early fatality. All 44 deaths, incidentally, occurred in either tuberculosis or general hospitals.

Performance of Autopsy

Of the total 1,134 deaths, 317 autopsies were performed: 96 of these were among the unreported and 221 among the reported deaths. The 96 unreported deaths with autopsy repre-

sent 41 percent of all 235 unreported deaths, whereas the 221 reported are only 25 percent of the total 899 reported. Unfortunately, it is impossible, without a field investigation, to determine in which instances diagnosis was not made until the autopsy was performed. But it may safely be assumed that this was so in many of these 96 unreported deaths, and this might thus be another reason for nonreporting. One can only surmise as to the number in this group in whom a diagnosis could have been made during life by means of proper and adequate diagnostic procedures.

Other Possible Factors

Deaths from tuberculosis occurring in New York State are allocated to the place of residence of the decedent, regardless of the length of such residence. Some of the unreported deaths may thus be of persons who have moved into the upstate New York area only a short time before death. Factual data on this point, however, could be secured only through a field study.

Finally, errors in the certification of the cause of death may account for some of the unreported cases.

Discussion

If it is accepted that reporting of tuberculosis cases is an essential administrative procedure in tuberculosis control, then the proportion of tuberculosis deaths not reported during life as cases becomes an important measure of some of the control activities. The observations reported here suggest that some of the nonreporting may be due to certain extenuating—or even uncontrollable—factors.

But, to the extent that such factors do play a part, at best they can account for only a portion of the unreported deaths. Nonreporting is often due to a lack of awareness of the need and purpose of reporting or a lack of a feeling of responsibility.

To be sure, the patient who is in a hospital or some other institution is at least segregated from his household associates. But one of the purposes of reporting is to assure that such associates are examined promptly. Besides, at the time of diagnosis, a fatal outcome cannot

be foretold, and reporting is thus essential for the sake of the posthospital care and supervision of the person diagnosed.

Thus, although there may be certain pathogenetic or other factors which tend to result in delayed reporting of tuberculosis cases, efforts must be intensified to improve the status of this essential activity in tuberculosis control. The health officer or other administrator responsible for tuberculosis control in a community can use each unreported death as a lead in such efforts.

Summary

Approximately 20 percent of persons dying from tuberculosis in New York State, exclusive of New York City, have not been reported as cases during life. Because of the vital place of reporting in tuberculosis control, this is a significant index in relation to the planning, conduct, and evaluation of the program.

However, certain observations suggest that nonreporting of cases before death may be due

in part to factors which are uncontrollable or, at least, difficult to control: (a) Although the number of unreported deaths has decreased substantially since 1940, the proportion of these to the total tuberculosis deaths has shown little change; (b) the proportion of unreported deaths is very high (57 percent) in general hospitals, where, on the whole, patients with acute types of tuberculosis are more likely to be admitted; (c) some of the unreported deaths are due to acute tuberculous meningitis and acute disseminated tuberculosis; (d) in some instances the diagnosis of tuberculosis is not made until autopsy; (e) some of the unreported deaths may be of persons who have only recently moved to the area; (f) erroneous certification of the cause of death may account for some unreported deaths.

But much of the delayed reporting is controllable, and efforts must be continued and intensified to secure the reporting of all tuberculosis cases promptly at the time of first diagnosis.

Reported Tuberculosis Morbidity and Mortality, 1952

Provisional reports from State health departments indicate that there were approximately 111,300 cases of tuberculosis newly reported in the United States during the calendar year 1952. Of these, about 85,000 were active and probably active cases (group "A" cases), giving an annual rate of 55 per 100,000 population.

Total new cases reported during 1952 represented a decline of about 6 percent from the number reported in 1951. A large portion of this decline is no doubt due to the new practices in reporting cases of tuberculosis and in counting them—*Public Health Reports*, 66:1291-1294 (1951).

The National Office of Vital Statistics' 10-percent sample of death certificates indicates that there were approximately 25,000 tuberculosis deaths, all forms, in 1952. This is a decline of approximately 16 percent from a similar provisional figure for 1951. Thus, the trends of the past several years are continued in 1952: a substantial decline in tuberculosis mortality but a comparatively small decline in the number of newly reported cases.

Village Polyclinics in Middle Java

By WARREN A. KETTERER, M.D., M.P.H.

THE PUBLIC HEALTH DIVISION of the Mutual Security Agency mission to Indonesia was requested in January 1952 to assign a medical officer for a 2-week period to two rural polyclinics in the Pati Peninsula on the Island of Java. The core of the peninsula is Mount Moerio, some 40 miles northeast of Semarang, and around the mountain is a fertile plain some 15 miles wide. During the war, dikes were destroyed and mosquito breeding increased greatly, causing a serious rise in the malaria incidence. This area between the mountain and the sea is densely populated.

The clinics are on opposite sides of the mountain, one in Margaredjo on the northeast side and the other in Kajuapu on the southwest side. Operated by the Mennonite Mission in Indonesia, which has had a medical relief unit in the area since 1902, the two polyclinics are located in Mennonite-owned schoolhouses. The staff, which lives at Pati, consists of a French physician, a German nurse, four Americans, including the administrator and the laboratory technician, and Javanese helpers. The latter act as interpreters, maintain records, dispense medicines, and dress wounds. No laboratory facilities are available at the Margaredjo clinic; the Kajuapu clinic has equipment for minimal laboratory procedures. The Margaredjo clinic operates 2 days a week, with

an average daily attendance of 150 patients; the Kajuapu clinic, 3 days a week, with an average daily attendance of 90 patients.

The writer's assignment to these clinics, from January 4 through 19, 1952, provided an opportunity to study the disease entities of an Indonesian rural population and to observe the problems involved in providing preventive and therapeutic services.

Analysis of Cases

A total of 1,029 patients, including 883 new patients, were seen during the 11-day visit. Sixty-one percent of the new patients were male, 39 percent female; 16.8 percent were under 9 years of age, 56.4 percent between 10 and 40 years, and 26.8 percent more than 40 years of age.

Only superficial examinations of the patients were possible because of the large number of patients and because of the language difficulty. A brief case history and a statement of the present complaint was obtained from each patient through an interpreter, translating through three languages. Consequently, minor diseases and complaints may have been overlooked if not indicated in the history. Even some major diseases may have been overlooked since many patients had more than one major disease. For example, one patient who had tuberculosis, scabies, malaria, trachoma, and tinea complained only of sudden severe diarrhea. Although laboratory facilities were minimal, laboratory confirmation was obtainable for tuberculosis, malaria, and gonorrhea.

An inventory of the major complaints of the 883 new patients (table 1) and of the major diagnoses for these patients (table 2) indicates

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that malaria, yaws, and tropical ulcers and their accompanying symptoms are responsible for 54 percent of the illness in this population group.

Primary or secondary nutritional deficiencies were present in almost 100 percent of the patients. The complaints of aching bones and joints were attributed to secondary nutritional deficiencies resulting from diseases such as malaria and tuberculosis. The cases presented in table 2 represent those in which beriberi or other avitaminosis was the major diagnosis.

Since malaria is endemic in the area, all cases of fever and chills were diagnosed as malaria unless another diagnosis was proved. Diagnoses of malaria were frequently confirmed by microscopic examination of both thick and thin

smears. Because of the apparent high incidence of malaria in Margaredjo, 39 school children were examined for palpable spleens; of these 29, or 74 percent, had splenomegaly. Spleen index confirmation for malaria is usually reliable in Indonesia, since leishmaniasis and schistosomiasis are not prevalent.

Ulcers were the presenting complaint of the greatest number of patients. The differential diagnosis of tropical ulcer as distinguished from gummas of yaws and syphilis was difficult. Multiplicity of lesions, presence of "patek" (frambesioma), history of trauma, and presence or absence of other signs and symptoms were used for diagnosis. Many patients with tropical ulcers gave histories of abrasions from bamboo, knife wounds, chengkol (hoe)

Table 1. Major complaints of 883 new patients

Complaint	Kajuapu		Margaredjo		Total	
	Number	Percent	Number	Percent	Number	Percent
<i>Dermatologic</i>						
Ulcer.....	85	13.2	156	25.6	241	19.3
"Bubul" (crab yaws).....	33	5.1	12	2.0	45	3.6
"Patek" (frambesioma).....	21	3.3	10	1.6	31	2.5
Pyoderma.....	14	2.2	25	4.1	39	3.1
Itching patches.....	18	2.8	16	2.6	34	2.7
Skin eruption.....	16	2.5	19	3.1	35	2.8
<i>Systemic</i>						
Aching bones and joints.....	65	10.1	64	10.5	129	10.3
Fever.....	50	7.9	63	10.3	113	9.0
Chills.....	32	5.0	35	5.7	67	5.4
Cough.....	47	7.3	53	8.7	100	8.0
Headache.....	14	2.2	7	1.1	21	1.7
<i>Ear, eye, nose, and throat; respiratory</i>						
Eye inflammation.....	30	4.7	16	2.6	46	3.7
Blindness, deafness.....	10	1.6	4	.7	14	1.1
Dyspnea.....	13	2.0	10	1.6	23	1.8
Earache and/or discharge.....	11	1.7	8	1.3	19	1.5
<i>Genitourinary</i>						
Genital lesion.....	14	2.2	2	.3	16	1.3
Dysuria.....	13	2.0	2	.3	15	1.2
Genital discharge.....	12	1.9	3	.5	15	1.2
"Woman's disease".....	8	1.2	1	.2	9	.7
<i>Other</i>						
Diarrhea.....	9	1.4	12	2.0	21	1.7
Abscess.....	9	1.4	10	1.6	19	1.5
Bone deformities.....	11	1.7	0	0	11	.9
Painful feet.....	14	2.2	6	1.0	20	1.6
Miscellaneous.....	93	14.5	75	12.3	168	13.4
Total.....	642		609		1,251	

lacerations of feet and toes, burns, shrapnel wounds, and bites from leeches and boars.

The penicillin provided by the Indonesian Ministry of Health was used sparingly and in minimal recommended doses. However, the response to penicillin therapy was unusually dramatic. Huge facial swellings from long-standing purulent otitis media and mastoiditis disappeared overnight. Three days after receiving 300,000 units of penicillin aluminum monostearate followed by warm soaks, a patient with a vast granulating infection of the entire hand and forearm returned with all but a few isolated areas healed. Several persons with double and triple infections of differing etiology responsive to penicillin were successfully treated with one injection of 300,000 units of the drug.

Yaws was prevalent, especially in the Margaredjo area, and was diagnosed on the basis of signs and symptoms in 205 of the 883 patients, although blood tests were not available. Sev-

eral cases of severe late yaws were observed in addition to the all-too-prevalent crab yaws and larger destructive gummas.

The most common eye disease found among these patients was trachoma, which was seen in all stages.

Acute venereal diseases were more prevalent in Kajuapu than in Margaredjo, a venereal disease being the major diagnosis for 11 percent and 2 percent of the patients, respectively. The proximity of Kajuapu to a military camp may explain this difference. The converse was observed in the geographic incidence of tropical ulcer and *falciparum* malaria.

Scabies, avitaminosis, and tuberculosis, diseases common to both clinics, were comparable in incidence. Cases of tuberculosis, however, were undoubtedly undertabulated because only those patients presenting obvious symptoms or whose sputum was positive on direct examination were included. Since no laboratory was available at Margaredjo, Kajuapu showed a

Table 2. Major diagnoses for 883 new patients

Diagnosis	Kajuapu		Margaredjo		Total	
	Number cases	Percent of 428 patients	Number cases	Percent of 455 patients	Number cases	Percent of 883 patients
Malaria.....	47	11.0	94	20.7	141	16.0
Tropical ulcer.....	(20)	(4.7)	(110)	(24.2)	(130)	(14.7)
Nontraumatic.....	5	1.2	64	14.1	69	7.8
Traumatic.....	15	3.5	46	10.1	61	6.9
Yaws, all types.....	137	32.0	68	14.9	205	23.2
Tuberculosis.....	41	9.6	30	6.6	71	8.0
Trachoma.....	25	5.8	12	2.6	37	4.2
Avitaminosis ¹	31	7.2	36	7.9	67	7.6
Scabies.....	34	7.9	35	7.7	69	7.8
Dysentery.....	8	1.9	12	2.6	20	2.3
Syphilis, all types.....	11	2.6	5	1.1	16	1.8
Gonorrhea.....	28	6.5	4	.9	32	3.6
Lymphogranuloma venereum.....	5	1.2	0	0	5	.6
Chancroid.....	4	.9	0	0	4	.5
Granuloma inguinale.....	1	.2	0	0	1	.1
Tinea.....	11	2.6	17	3.7	28	3.2
Impetigo.....	5	1.2	14	3.1	19	2.2
Otitis media, mastoiditis.....	9	2.1	8	1.8	17	1.9
Pneumonia.....	5	1.2	4	.9	9	1.0
Heart disease.....	6	1.4	7	1.5	13	1.5
Leprosy.....	1	.2	0	0	1	.1
Other.....	101	-----	60	-----	161	-----
Total.....	530	-----	516	-----	1,046	-----

¹ As a single diagnosis.

much larger number of positive tuberculosis cases.

These statistics indicate the importance of regional surveys prior to undertaking preventive measures to control these diseases, particularly in a country where personnel and supplies are scarce.

Needs and Objectives

The poverty and disease existing among the population of this rich agricultural area of the Pati peninsula appear representative of much of rural Java. Despite the seeming agricultural prosperity of the peninsula, nutritional deficiencies are almost universal. Superimposed upon poverty and malnutrition are diseases induced by poor housing, lack of sanitation, overcrowding, and lack of education. Families are unable to work because of debility and sickness; thus they are caught in the vicious cycle of illness and poverty.

The need and desire for and appreciation of medical care were demonstrated by the distances the patients traveled, usually on foot, to reach the clinics; 48 percent of the 883 new patients came 4 or more miles over muddy and rough terrain. Occasionally patients travel for 8 or 10 hours by horse cart, arriving the night before they attend the clinic. Sometimes regular trips are arranged for groups who share expenses. Although no specific records of the percentage of patients making return visits to the clinic were kept, approximately half of the patients who had been requested to return did so.

For the most part, the nearly 1,000 practicing physicians in Indonesia are engaged in curative rather than preventive health activities. They object to the competition of foreign-staffed dispensaries. Therefore, increased preventive programs in public health appear to be the most practicable for reducing the suffering of the masses of the rural population.

About 90 percent of the Indonesian Ministry of Health budget of 500 million rupiah (less than \$1 per capita per year) is devoted to curative medical care and administration. Hence, technical assistance will be needed for the preventive programs. Outside assistance in the form of commodities and personnel would significantly improve, perhaps double or triple,



At the request of the Government of Indonesia, the United States, through its Technical Cooperation Administration Mission to Indonesia, is assisting the country in numerous health activities: disease control, professional education, and the rehabilitation of health centers, hospitals, clinics, and research and teaching institutions. Shown here are a maternal and child health clinic in Djakarta, Java (above) and preparations for giving injections in the treatment of yaws (below).



present preventive efforts against some of the major diseases.

The diseases which can be prevented most effectively deserve first attention. In a country having perhaps 30 million cases of malaria and 12 million cases of yaws, supplies, equipment, and technicians could bolster existing malaria and yaws campaigns by increasing area coverage and assisting in training local subprofessional personnel to carry on activities.

Tuberculosis presents one of the most difficult and threatening public health problems. Currently, there appears to be an overemphasis on leprosy—a far less menacing disease than tuberculosis—and an underemphasis on tuberculosis. A reversal of attention to these diseases would seem desirable. Practical isolation facilities and BCG inoculation might be feasible, but mass fluoroscopy and X-ray are not indicated until minimal isolation can be provided for the great numbers of persons with active tuberculosis who are now spreading the disease.

Basically, additional education facilities for the Indonesian rural population, which should provide health education as well as other types,

are essential. For those unable to obtain formal schooling, health education devices such as the nutritional posters currently used by the Ministry of Health, showing nutritious yet inexpensive foods should be expanded. Medical, nursing, and public health training for Indonesians should be accelerated through the loan of foreign professors to Indonesian institutions and through the advance training of Indonesians elsewhere.

The prevention of diseases that increase poverty and reduce the ability of labor to produce food in the fertile and densely populated Pati peninsula appears to be a necessary objective of the Indonesian Government, both from the standpoint of economic gain and from the standpoint of strengthening the Government's relations with the people. The World Health Organization, the United Nations International Children's Emergency Fund, and other international organizations as well as the Technical Cooperation Administration are rendering effective assistance to the Indonesian Government in the implementation of its program.

Veterans' Syphilis Records

Syphilis registers for veterans of the United States Army and of the United States Air Force were transferred from the dermatology and syphilology section of the Veterans Administration to the Department of the Army on April 13, 1953. The Department of Medicine and Surgery of the Veterans Administration has announced the closing of the activities of the syphilis follow-up study unit. Public health agencies need no longer return VA Forms 10-2550 to the Veterans Administration.

Health departments, clinics, physicians, and others wishing information concerning these records should direct inquiries to: Military Personnel Records Center, The Adjutant General's Office, Department of the Army, 4300 Goodfellow Boulevard, Building 203, St. Louis 20, Mo.

Inquiries concerning syphilis records for Navy and Marine Corps veterans should be directed to: Department of the Navy, Bureau of Medicine and Surgery, Physical Qualifications and Medical Records Division, Code 33, Washington 25, D. C.

Inquiries about the syphilis records of former members of the United States Coast Guard should be sent to: The Commandant, United States Coast Guard, Attention Chief Medical Officer, Washington 25, D. C.

Serology of Brucellosis in Rural Indiana

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REGIONAL LIVESTOCK investigations in conjunction with human epidemiological studies have shown swine and cattle to be major reservoirs of brucellosis in this country. Swine have been primarily implicated in some areas and cattle in others. However, the actual prevalence of infection in the rural human population, a group with a high potential of exposure, and the extent to which it parallels the prevalence in farm animals remains more or less a matter of conjecture.

To obtain a more comprehensive concept of the human-livestock relationships, representatives of several agencies concerned with the problem of brucellosis, meeting in Indianapolis in 1946, suggested a field study of certain Indiana localities. They proposed to investigate areas representative of dairy cattle, swine breeding, and mixed types of animal husbandry by testing farm families and livestock for serologic evidence of infection. It was hoped that the extent of relative infection might then be inferred from the distribution of titers.

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The project was jointly sponsored by the Bureau of Animal Industry; the department of veterinary science, Purdue University; the Indiana State Board of Health; and the Public Health Service.

Accordingly, the township was selected as a suitable survey unit. The ideal township was considered one where the desired type of animal husbandry was practiced, a high percentage of resident families owned their farms, good lateral roads and a centrally located school or community building existed, no centers of urban population were implicated, and finally, the people were believed to be receptive to such a project. These criteria and recommendations by agencies familiar with the regional agriculture of the State guided the selection of survey areas.

During the winter months of 1946 through 1950 nine townships were surveyed. Blood samples were collected from a major portion of the farm population and livestock and were tested for *Brucella* agglutinins. The average area of the townships was 34 square miles. Surveys were conducted in the winter to avoid conflict with farm activities. Upon completion of all studies, 2,622 persons and 13,373 animals on 930 farms had been tested.

When all data were compiled, there appeared to be little correlation between the human and animal serology. The comparatively small number of human reactors were distributed far more uniformly among the nine townships than were the livestock reactors. These coexisting serologic patterns are presented and discussed in this report.

Plan of the Surveys

Organizing local citizens for the surveys proved an interesting experience in public health tactics. With the county agricultural agent as the pivot, the proposed study was first offered to members of the county medical so-

ciety, then to community leaders who could serve in an organizational capacity. Intensive publicity preceded the actual testing, which was usually completed within 1 month following formal selection of a township for survey. For the most part, local physicians collected the human blood samples, and veterinarians from the Bureau of Animal Industry, U. S. Department of Agriculture, collected the animal blood specimens (1).

Upon completion of each survey, a résumé of the serologic results was reported to the county agent's office for publication in the local newspaper. Positive results of individual human tests were forwarded to physicians designated by the participants at the time their blood specimens were drawn. Results of the animal tests were reported directly to the respective owners. When animal reactors were found on the premises, a State veterinarian or one from the Bureau of Animal Industry returned to discuss possible control methods with the owners.

It should be noted that the incorporation of educational benefits for those persons supplying the raw data and the coordination of both technical and lay facilities of many agencies were integral factors in the program's success.

Serologic Methods

Human serums. Agglutination tests were performed at the Indiana State Board of Health Laboratories. Serums were examined by employing the rapid plate method (Huddleson) as described by Hitchens (2), and a standardized *Brucella abortus* antigen. In performing the tests, serums and antigen were mixed in proportions to give results comparable to those obtained from the examination of serum dilutions of 1:40 and 1:80 by the test tube method. Strongly reacting serums were further diluted to determine titers.

Livestock serums. Specimens collected from animals were examined at the brucellosis testing service laboratory of Purdue University except for those obtained in the Elmore and Steele township surveys, which were tested in a Bureau of Animal Industry mobile laboratory unit.

Serums were examined by using the official

Bureau of Animal Industry plate agglutination technique and *Br. abortus* antigen. In this test, serum and antigen are mixed in proportions to give results comparable to those of the test tube method with serum dilutions of 1:50, 1:100, and 1:200. Examination of swine serums included the 1:25 dilution.

Results

Only individuals 10 years of age or older were examined for *Brucella* agglutinins. Of 2,622 persons, 310 (11.8 percent) came from nearby towns and the remaining 2,312 from rural areas. The former were for the most part included in the Elmore, Steele, and Winfield township surveys. The extent of serologic activity encountered in the total population tested, urban and rural, is summarized in table 1. It was rather surprising to find that only 60 persons (2.3 percent) showed any evidence of agglutinins, and of these only 3 individuals (0.1 percent) 10 years of age or older had a positive titer (4+ reading) of 1:80 or higher. Of the group of 60 persons with agglutinins, only 2 were urban residents and 2 were rural children 10-13 years of age. The remainder were all rural adults.

Of the 2,312 rural persons examined, 16.5 percent were 10-13 years of age, 43.7 percent were males 14 years or older, and 39.8 percent were females 14 years or older. With the exception of Prairie Township, it is estimated that 40-90 percent of the rural population in these age groups were tested in the individual areas. The response in Prairie Township was somewhat less satisfactory. Since the study was designed

Table 1. Extent of serologic activity found in total population¹ tested

Agglutination reading	Number reacting	Percent- age of popula- tion tested	Percent- age of reacting group
1 + at 1:40.....	24	0.9	40.0
>2 + at 1:40.....	33	1.3	55.0
<4 + at 1:80.....			
>4 + at 1:80.....	3	.1	5.0
Total reacting.....	60	2.3	100.0

¹ 2,622 persons, 10 years of age and older.

Indiana townships

where *Brucellosis* surveys were conducted

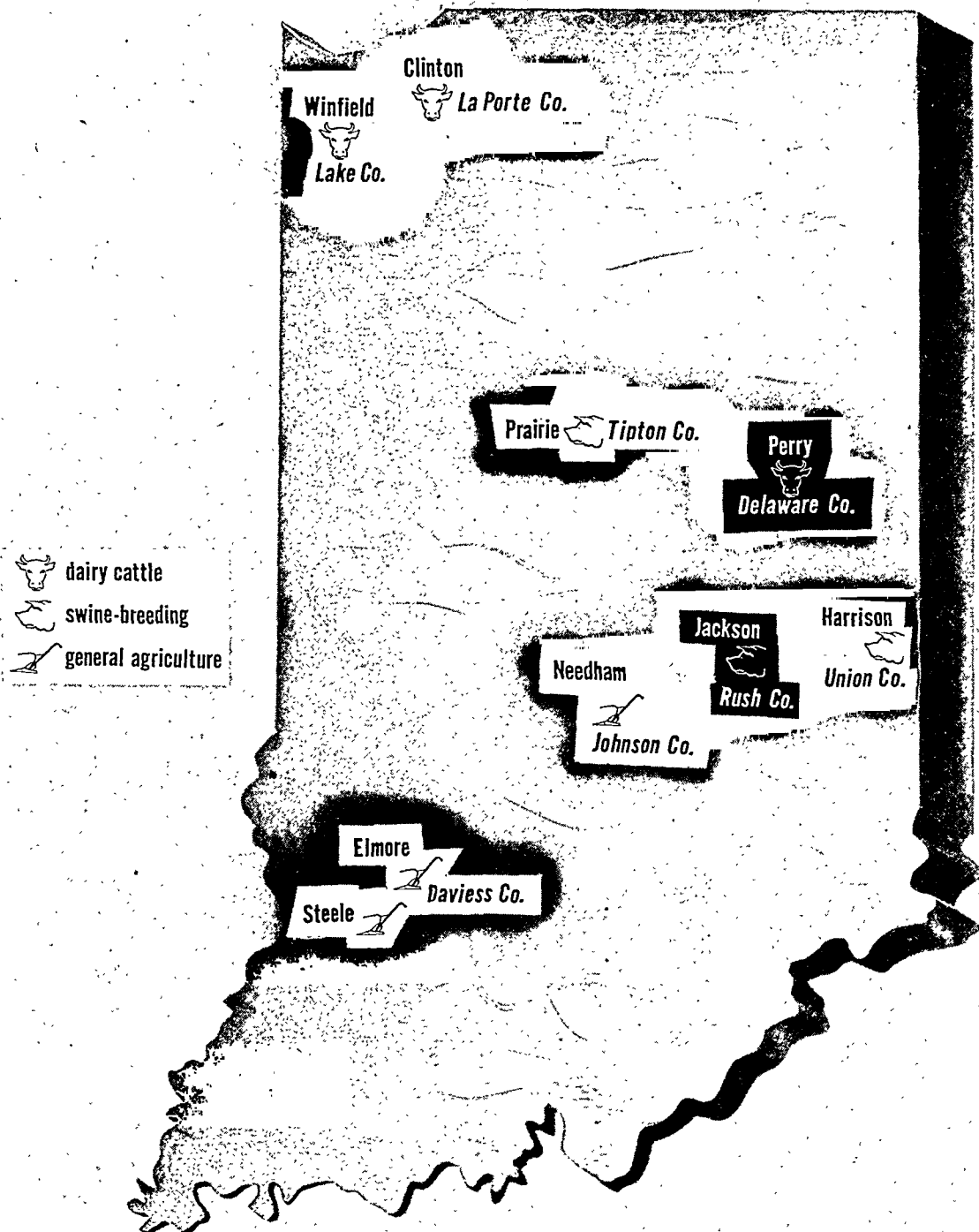


Table 2. Number and percentage of rural persons 14 years and older found with brucellosis titers¹ in the townships

Township	Both sexes			Males			Females		
	Tested	Number	Percent	Tested	Number	Percent	Tested	Number	Percent
<i>Dairy cattle</i>									
Perry.....	361	5	1.4	182	3	1.6	179	2	1.1
Clinton.....	178	3	1.7	96	3	3.1	82	0	0
Winfield.....	223	5	2.2	118	3	2.5	105	2	1.9
<i>Swine breeding</i>									
Harrison.....	169	2	1.2	93	1	1.1	76	1	1.3
Prairie.....	138	2	1.4	66	1	1.5	72	1	1.4
Jackson.....	158	1	.6	82	1	1.2	76	0	0
<i>Mixed husbandry</i>									
Elmore.....	251	5	2.0	138	4	2.9	113	1	.9
Steele.....	196	4	2.0	107	3	2.8	89	1	1.1
Needham.....	256	7	2.7	128	4	3.1	128	3	2.3
Total.....	1,930	34	² 1.8	1,010	23	² 2.3	920	11	² 1.2

¹ At least a 2+ reading with serums diluted 1:40.

² Standard errors are 0.3 percent for both sexes, 0.5 percent for males, and 0.4 percent for females.

primarily to survey the mature farm population, attention is focused upon the prevalence of reactors among the 1,930 persons 14 years and older who were living in the rural areas. The number of reacting individuals in this group is given for each township in table 2. Based on all nine township samplings, 1.8 percent of the persons tested displayed some positive titer. Among the males, 2.3 percent reacted. Of the females, 1.2 percent reacted. This difference of 1.1 percent was found to be of only slight statistical significance.

A tabulation of information obtained concurrently with the blood testing indicated more than 80 percent of the adult males, approximately 70 percent of the children 10-13 years of age, but only 54 percent of the adult females with histories of direct animal contact. All those rural persons showing a serologic titer, with four exceptions, claimed animal contact. The four exceptions, however, did drink raw milk. Information on the consumption of raw milk by persons included in the surveys was incomplete.

Prevalence in Cattle

The majority of animals tested were cattle, 7,918 altogether. At least 60-80 percent of the

adult cattle were surveyed in each township except Prairie where the percentage was somewhat less. At the time of drawing the blood samples, field crews obtained information re-

Table 3. Composition of cattle population tested and distribution of serologic reactors¹

Group	Number tested	Percentage of total population	Reactors	
			Number	Percentage of group
All cattle.....	7,918	100.0	543	6.9
Vaccinated.....	788	10.0	179	22.7
Unvaccinated.....	6,999	88.4	347	5.0
Unknown.....	131	1.6	17	13.0
Unvaccinated cattle:				
Males.....	404	5.1	6	1.5
Under 1 year.....	65	.8	0	0
1 year or more.....	339	4.3	6	1.8
Females.....	6,595	83.3	341	5.2
Under 1 year.....	348	4.4	7	2.0
1-1.9 years.....	823	10.4	9	1.1
2 years or more.....	5,424	68.5	325	6.0

¹ At least a 4+ agglutination reading in 1:100 dilution.

garding age, sex, and prior use of *Brucella* vaccine. These data are summarized in table 3 along with the total number (543) and percentage (6.9) of reactors found.

A bovine reactor in this study is defined as one whose serum at a dilution level of 1:100 or higher completely agglutinated the standard antigen. Those animals giving a partial reaction at this level or a complete reaction only in the 1:50 dilution are designated as suspects. Data are tabulated separately for all cattle and for only unvaccinated cattle. These two analyses are included to facilitate interpretation of results and their subsequent comparison with findings reported from other areas.

In table 4 an area breakdown is given for the number and percentage of cattle reactors encountered among the total number tested, among the unvaccinated animals only, and among the unvaccinated mature females. The latter group contributed 93.7 percent of all unvaccinated cattle reactors. In addition to the positive reactors, 645 (8.1 percent) of the total cattle tested were found to be suspects. When the results from testing vaccinated ani-

mals were excluded from the data, this number was reduced to 440 (5.6 percent).

Final tabulations showed that 10 percent of the tested animals, or one-third (32.8 percent) of all reactors, had been previously vaccinated either as calves or as adults. Of the vaccinated cattle, 22.7 percent were reactors and an equal number were suspects. A certain number of the vaccinated animals which were reactors had been immunized just before the time of testing. The inclusion of results from testing the vaccinated animals increased the percentage of reactors approximately 2 percent, from 5.0 to 6.9.

Inspection of the data in table 4 indicates the variation in the percentage of cattle reactors—and probable infection—to be found in the different localities. When the data were tested for statistical significance, the percentage of reactors encountered in the dairy-cattle townships was found to be significantly different from that found in each of the other agricultural categories. Thus, brucellosis in cattle appears to be much less a problem in some areas than in others—less especially in Steele Town-

Table 4. Cattle reactors ¹ found in each township

Township	All cattle			Unvaccinated cattle					
	Tested	Reactors	Percent	Total			Mature females ²		
				Tested	Reactors	Percent	Tested	Reactors	Percent
<i>Dairy cattle</i>									
Perry-----	1, 178	105	8. 9	989	55	5. 6	744	53	7. 1
Clinton-----	1, 039	66	6. 4	774	30	3. 9	605	30	5. 0
Winfield-----	1, 295	173	13. 4	1, 112	139	12. 5	892	129	14. 5
<i>Swine breeding</i>									
Harrison-----	601	45	7. 5	505	9	1. 8	388	9	2. 3
Prairie-----	654	25	3. 8	631	17	2. 7	500	12	2. 4
Jackson-----	566	24	4. 2	563	21	3. 7	437	21	4. 8
<i>Mixed husbandry</i>									
Elmore-----	955	14	1. 5	955	14	1. 5	739	14	1. 9
Steele-----	610	12	2. 0	591	3	. 5	476	3	. 6
Needham-----	1, 020	79	7. 7	879	59	6. 7	643	54	8. 4
Total-----	7, 918	543	³ 6. 9	6, 999	347	³ 5. 0	5, 424	325	³ 6. 0

¹ At least a 4+ agglutination reading in the 1:100 dilution.

² 2 years of age or older.

³ Standard errors are 0.3 percent for each of the three groups.

Table 5. Sex distribution of swine reactors¹ found in each township

Township	All swine			Males			Females		
	Tested	Reactors	Percent	Tested	Reactors	Percent	Tested	Reactors	Percent
<i>Dairy cattle</i>									
Perry.....	574	6	1.0	48	1	2.1	526	5	1.0
Clinton.....	301	3	1.0	17	0	0.0	284	3	1.1
Winfield.....	123	5	4.1	8	0	0.0	115	5	4.3
<i>Swine breeding</i>									
Harrison.....	822	20	2.4	53	1	1.9	769	19	2.5
Prairie.....	403	4	1.0	25	2	8.0	378	2	.5
Jackson.....	1,118	89	8.0	59	2	3.4	1,059	87	8.2
<i>Mixed husbandry</i>									
Elmore.....	397	5	1.3	23	0	0.0	374	5	1.3
Steele.....	393	31	7.9	26	0	0.0	367	31	8.4
Needham.....	271	14	5.2	20	4	20.0	251	10	4.0
Total.....	4,402	177	² 4.0	279	10	² 3.6	4,123	167	² 4.0

¹ At least a 4+ agglutination reading in the 1:50 dilution.² Standard errors are 0.3 percent for all swine, 1.1 percent for males, and 0.3 percent for females.

ship than in Winfield Township, which is located in the Chicago milkshed.

Prevalence in Swine

For the purpose of this study, a swine reactor is considered one whose serum agglutinated *Brucella* antigen completely in a serum dilution of 1:50 or higher. If merely a partial reaction occurred at this level or if the reaction was evident only at the 1:25 dilution level, the animal is termed a suspect.

In all 9 surveys 4,402 swine were tested, 279 males (6.3 percent) and 4,123 females (93.7 percent). Approximately 50-80 percent of the total mature swine in each area were surveyed.

Four percent of the hogs (177) were found to be reactors and 417 (9.5 percent) were suspects; 3,808 (86.5 percent) were negative. The number of reactors found in each township is given in table 5. No statistical significance was noted in the percentage differences between the sexes. As with cattle, the percentage of swine reactors in the dairy-cattle areas was found to be significantly different from that of the swine-breeding areas as well as from that of the general agricultural category.

The presentation of serologic data does not entirely dispose of the question of prevalence of

Table 6. Swine suspects¹ found on farms having swine reactors²

Township	Total swine with agglutinins		Suspects found on farms having swine reactors	Reactors plus significant suspects ³	
	Reactors	Suspects		Number	Percent
<i>Dairy cattle</i>					
Perry	6	43	5	11	1.9
Clinton	3	16	3	6	2.0
Winfield	5	10	4	9	7.3
<i>Swine breeding</i>					
Harrison	20	49	23	43	5.2
Prairie	4	22	6	10	2.5
Jackson	89	127	79	168	15.0
<i>Mixed husbandry</i>					
Elmore	5	32	5	10	2.5
Steele	31	62	49	80	20.4
Needham	14	56	26	40	14.8
Total	177	417	200	377	8.6

¹ Less than a 4+ agglutination reading in the 1:50 dilution and agglutination at the 1:25 dilution level.² At least a 4+ agglutination reading in the 1:50 dilution.³ Suspects found on farms having swine reactors.

infection in this species. Control programs based on the eradication of only those animals showing a positive titer of 1:50 or higher often have failed. A certain percentage of animals manifesting lower titers will actually harbor *Brucella* and when retained may subsequently reinfect the herd, while indiscriminate disposal of all hogs reacting at this lower serum dilution level of 1:25 may result in the condemnation of many uninfected animals (3).

For these reasons, it is felt that whereas the higher titer is the more reliable index to infection in the random individual, the lower titer is more satisfactory for indicating infection in animals from herds where there are swine showing higher titers. Accordingly, the data obtained in the township surveys are further analyzed to show the number and percentage of suspects which were found on farms with swine showing higher titers (table 6). Approximately half the swine designated as suspects came from herds with swine having higher titers. When this number (200) is added to the 177 positive reactors, 377 or 8.6 percent of the total swine tested might well be considered as possibly harboring the infective organism.

Other Farm Animals

Other farm animals tested numbered 1,053: 671 sheep, 354 horses and mules, and 28 goats. None of the goats reacted. Of the sheep, 5 (0.7 percent) were positive reactors and 14 (2.1 percent) were suspicious. Of the horses and mules, 9 (2.5 percent) reacted positively, while 43 (12.1 percent) were considered suspects. The terms "reactor" and "suspect" are defined the same as previously for cattle.

Farms with Reactors

In obtaining specimens from the livestock, Bureau of Animal Industry field crews visited 930 farms. It is estimated that the livestock on approximately 75 percent of the premises in the nine areas were surveyed. One or more animal reactors were found on 260 (28.0 percent) of the farms. Nine farms (1.0 percent) harbored horse or mule reactors and 5 (0.5 percent) harbored sheep reactors. There was none with reacting goats. The township distribution of premises with cattle and swine reactors is given

in table 7. It can be seen from these figures that the exclusion of data collected from farms having vaccinated animals reduces approximately 5 percent the number of farms with cattle reactors.

The infrequent occurrence of both cattle and swine reactors on the same premises is of interest. Considering only those farms having all unvaccinated animals (849), cattle reactors were found on 135 (15.9 percent). On the other hand, reactor or suspect swine, or both, were detected on only 35 of the 135 premises, although nearly all farms having a cattle reactor also had swine tested on the premises. Actually, only 6 (0.7 percent) of the 849 farms possessed both a cattle reactor and a swine reactor. The other 29 farms had only swine suspects.

In some townships a few large, heavily stocked farms accounted for a large percentage of the reactors. These data have not been presented because total animal counts were not obtained on all farms. However, there definitely appeared to be a direct relationship between the number of animals tested on a farm and the percentage of farms with animal reactors. When results from those farms which had vaccinated cattle on their premises were excluded from the data and when the remaining farms were tabulated according to the number of animals tested on each and a grouped frequency distribution table made, it was found that the number of farms with reactors increased with the indicated increase in herd size. Only 0.3 percent of the farms having 1-5 animals tested had swine reactors and 4.8 percent had cattle reactors whereas 27.4 percent of the farms having over 25 animals tested had swine reactors and 31 percent had cattle reactors. The other step intervals showed gradations between these two extremes. These results are consistent with those of many investigators.

In table 8, the proportion of farms with reactors and the percentage of reactors found in the various species have been related with respect to the three types of agricultural areas.

Discussion

Despite the fact that percentages of cattle and swine reactors varied from one township to

another, the percentages of human reactors remained fairly constant. An inspection of the data does not indicate any direct correlation between prevalence of animal and human agglutination titers.

In attempting an explanation for these results, consideration must be given to several possibly significant factors. Serology itself is a cumulative index of past experiences which differ fundamentally in the relatively stable rural population and in the constantly changing livestock. Furthermore, titers resulting from exposure to the animals surveyed cannot be differentiated from titers resulting from contact with previously owned animals. Although there may exist a direct correlation between the incidence of new infections in human and animal populations, this study would not necessarily reveal such a relationship.

Animal contacts are largely determined by regional agricultural practices and vary from one locality to another or even from farm to farm. Virulence of *Brucella* strains are different. Consequently, a farm with many in-

fectured swine or beef cattle raised for commercial markets may not constitute the exposure provided by a single milk cow, hog, or possibly a riding horse infected with a more virulent strain of *Brucella*. It is possible that these interrelated factors may have operated to produce fairly uniform serologic patterns in man and not in the livestock.

It should be further mentioned that a sampling error in the human testing may exist. Since the blood specimens were collected at a designated testing station in each township, persons confined to their living quarters were not surveyed. This would mean that any acutely ill brucellosis cases were not tested. However, in view of the variety of diseases occurring in a population group during the winter months, it does not seem very probable that the ratio of acute brucellosis cases to the composite of other disease would have been so abnormally high as to alter the findings significantly. Inspection of the data does not indicate an unduly poor response on the part of any age or sex group to account for the small

Table 7. Number and percentage of surveyed farms with animal reactors

Township	Farms surveyed	Farms with reactors ¹							
		All species		Cattle				Swine	
				Total		Unvaccinated			
		Number	Percent	Number	Percent	Number	Percent ²	Number	Percent
<i>Dairy cattle</i>									
Perry	137	43	31.4	43	31.4	23	20.7	4	2.9
Clinton	79	27	34.2	25	31.6	10	16.9	2	2.5
Winfield	88	50	56.8	48	54.5	34	45.9	5	5.7
<i>Swine breeding</i>									
Harrison	63	22	34.9	11	17.5	8	13.3	11	17.5
Prairie	92	18	19.6	15	16.3	12	13.5	4	4.3
Jackson	75	33	44.0	12	16.0	11	14.9	19	25.3
<i>Mixed husbandry</i>									
Elmore	161	15	9.3	11	6.8	11	6.8	5	3.1
Steele	115	10	8.7	4	3.5	3	2.7	6	5.2
Needham	120	42	35.0	31	25.8	23	21.1	8	6.7
Total	930	260	³ 28.0	200	³ 21.5	135	³ 15.9	64	³ 6.9

¹ Swine readings are 4+ agglutination in 1:50 dilution; other animals, 4+ in 1:100 dilution.

² Percentage of those farms which had no vaccinated animals on premises on which cattle reactors were found.

³ Standard errors for each group, reading from left to right, are 1.5 percent, 1.4 percent, 1.2 percent, and 0.8 percent.

Table 8. Summary of percentage of incidences of brucellosis serologic reactors and percentage of farms with reactors according to agricultural category of townships

Agricultural category	Human	Cattle ¹	Swine	Equine	Sheep	Farms with reactors		
						All species	Unvaccinated cattle	Swine
Dairy cattle.....	1.7	7.8	1.4	3.4	0.8	39.5	27.5	3.6
Swine breeding.....	1.1	2.8	4.8	3.7	.7	31.7	13.9	14.8
General agriculture.....	2.3	3.1	4.7	1.3	0	16.9	9.7	4.8
Total.....	1.8	5.0	4.0	2.5	.7	28.0	15.9	6.9

¹ Unvaccinated.

number of positive reactors. There is a possibility, however, that the seasonal nature of the surveys did not take into consideration any peak occurrences of high titers which may have prevailed in Indiana during certain months.

Despite the many variables which enter into a study of this type, the importance of obtaining serologic patterns as an indication of the distribution and relationship of human and animal brucellosis should not be minimized. While the foregoing data are not conclusive with regard to the effect of animal brucellosis upon the spread of human infection, they are presented as evidence of the wide regional variation which may be found in the character of the animal reservoirs of brucellosis and further as an indication of serologic patterns which may possibly coexist in rural areas such as the ones surveyed.

Summary

Serologic surveys for the relative prevalence of *Brucella* agglutinins in livestock and farm families were conducted in nine rural townships representing the dairy cattle, swine breeding, and general agricultural areas of Indiana.

Less than 2 percent of 2,622 residents 14 years of age or older reacted positively to some degree. The percentage of reactors was approximately the same in each of the townships.

Of 13,373 farm animals, approximately 6 percent were found to be reactors. Of the 930 farms surveyed, 28.0 percent were found to harbor livestock reactors. Four percent of the swine population, 6.9 percent of the cattle, 2.5

percent of the horses and mules, and 0.7 percent of the sheep were reactors. Ten percent of all cattle had been previously vaccinated. When results of testing these animals were excluded from the data, 5.0 percent of the cattle were reactors. These percentages varied considerably in the different townships.

If those swine suspects found on farms having hogs with higher titers were added to the number of actual reactors, then 8.6 percent of the swine population surveyed might be considered as possibly *Brucella*-infected.

ACKNOWLEDGMENTS

Acknowledgment is made of the services of Dr. Raymond Fagan, D.V.M., epidemiology branch, and Dr. John Scruggs, D.V.M., veterinary public health section, Communicable Disease Center, Public Health Service, in coordinating the study, and of Dr. Thurman B. Rice and Kathleen Gay Harper, Indiana State Board of Health, in promoting the program and compiling the data.

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Health Services and Juvenile Delinquency

By MARTHA M. ELIOT, M.D.

In the February 1953 issue of Public Health Reports (p. 186) Dr. Martha M. Eliot states that the Children's Bureau is devoting major attention to the serious problem of getting more effective treatment for juvenile delinquents.

Her paper in this issue touches upon the close relationship between child health and child welfare, and between health services and social services. In this same issue, beginning on p. 578, Dr. George E. Gardner discusses three typical cases of juvenile delinquency referred to a psychiatric clinic by a juvenile court.

The Children's Bureau has already enlisted the interest of a wide range of juvenile experts and national and community groups in its special juvenile delinquency conferences on juvenile courts, training schools, and training of personnel to work with delinquent children.

THE MANY WAYS in which the health services have contact with children and influence their behavior need no comment, but perhaps the importance of this relationship so far as reducing juvenile delinquency is concerned does need to be explored. I believe the health services have a major role to play in efforts to solve this problem. Through the usual maternal and child health services, and in other ways, they are in a position to make a significant contribution to programs aimed at preventing juvenile delinquency; through mental health programs for children, such as child guidance clinics, they may aid materially the work of courts and institutions offering treat-

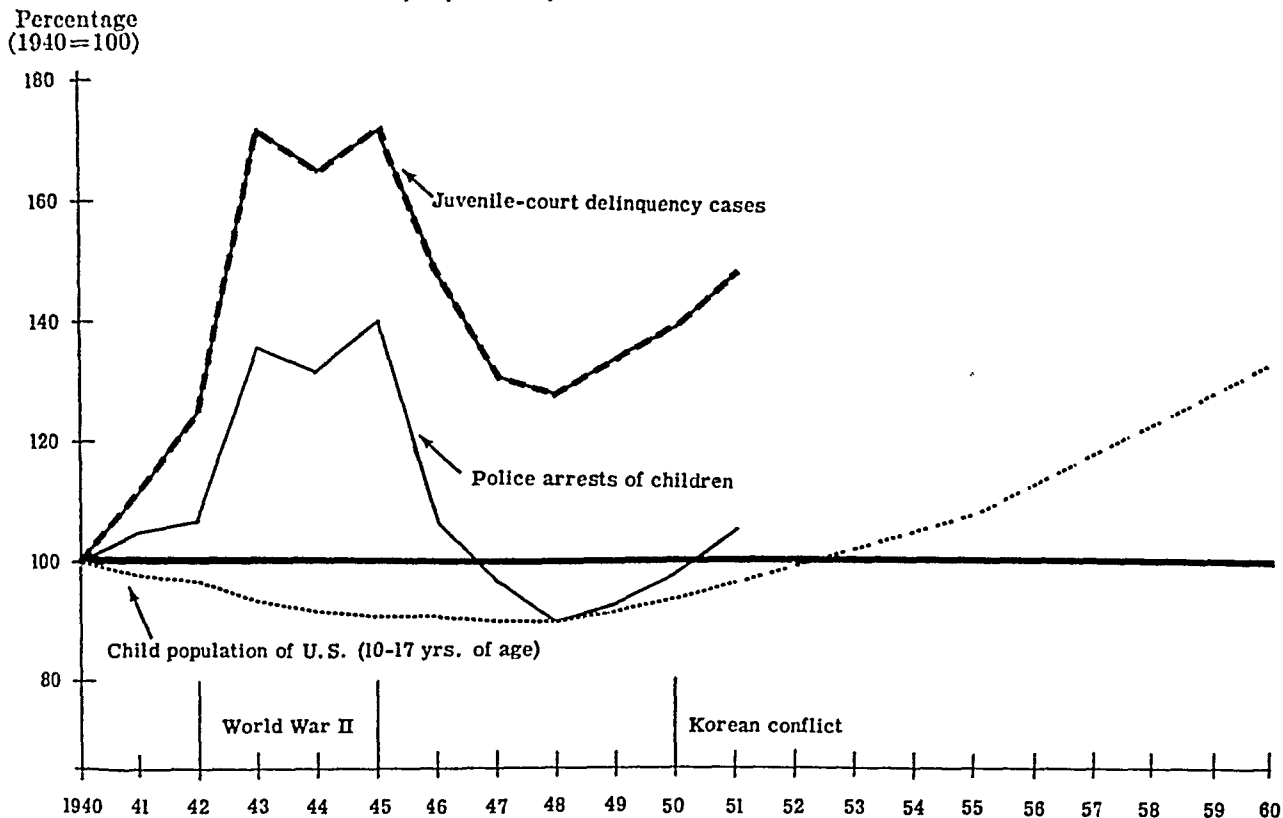
ment to children who have already become delinquent.

The necessity for such programs cannot be stressed too greatly. More than a million boys and girls were picked up by the police in 1951 because of delinquent behavior. About 350,000 youngsters were brought before juvenile courts. Between 1948 and 1951, the number of children coming before the juvenile courts that report to the Children's Bureau increased 17 percent (see fig. 1). However, the number of children in the United States in the principal age group affected (10 to 17) increased only 5 percent. During this period, then, the delinquency rate increased faster than the rate for the particular child population category.

Thus, even now hundreds of thousands of delinquent children require prompt and sound treatment if they are to be prevented from continuing in careers of delinquency and crime. Those who are coming to the attention of the police and the courts for the first time should have this treatment early. For most of these there would be more hope of satisfactory re-

Prior to her appointment as chief of the Children's Bureau in September 1951, Dr. Martha M. Eliot was assistant director-general of the World Health Organization for 2 years. As assistant chief in 1934 and associate chief in 1941, Dr. Eliot headed the Children's Bureau health and medical services.

Figure 1. Juvenile delinquency is rising. Estimated child population (10-17 years) for 1951-60 projected by the Bureau of the Census.



habilitation if prompt help were available than for those who have repeatedly been before the courts.

At the same time, preparation for an additional load of cases must be made. During the next 7 or 8 years, it is expected that there will be a tremendous increase in the age group in which most delinquent children fall, that is, the 10- to 17-year old category. The Bureau of the Census estimates that by 1960 there will be approximately 42 percent more children in this age group than there were in 1951 (see fig. 2). In other words, for every 10 boys and girls who need our attention and care now, in a few years there may be 14 or more.

We must take every precaution we can to prevent these young people from becoming delinquent, but at the same time we must realistically face the probability that some of them will get into trouble and will need proper treatment.

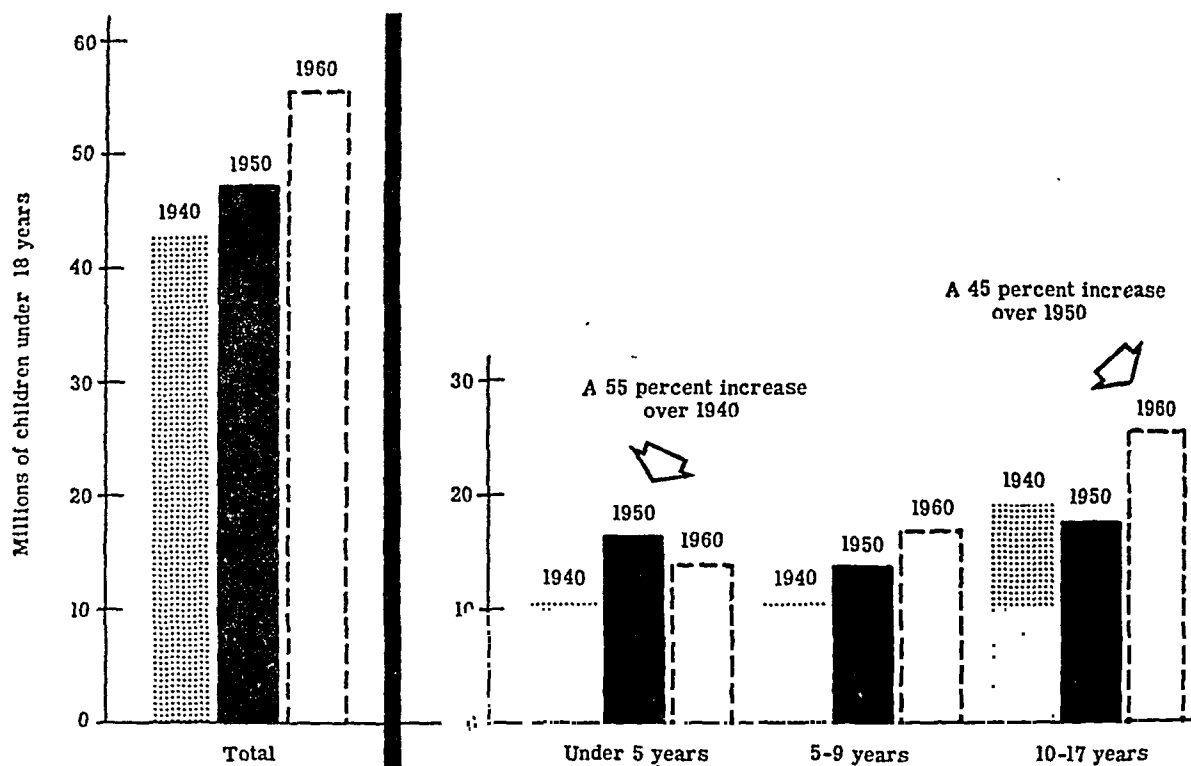
Focus on Local Agencies

The current program of the Children's Bureau, therefore, is to encourage communities to

do everything in their power to prevent further delinquency but not to fail to attend to the wants of those youngsters who have already become delinquent in the eyes of the law or who are on the verge of becoming so. The Bureau is recommending that communities and States strengthen certain agencies that are entrusted with the major responsibility for taking care of our young delinquents. These agencies are the police, the juvenile court, the detention home, and the training school. The Bureau is also urging that States and communities look to their administrative mechanisms that should provide focal points for coordination and integration of all the services these children need.

The experience of agencies that carry particular responsibility for treatment of delinquent children should give us sufficient warning that they need to be improved. More than one-third of the young people who come before our juvenile courts have been there previously. Even our better training schools are rarely able to claim success with more than 50 to 60 percent of the boys or girls they receive. And, of

Figure 2. The Nation now has more children than ever before—1 of every 3 persons in the United States is under 18. 1960 population estimates projected by the Bureau of the Census.



course, the most telling proof that our treatment programs for juvenile delinquents are not successful is the fact that the large majority of our present-day adult criminals started out as known juvenile delinquents.

The reasons for these failures are fairly evident. To give each delinquent young person the kind of treatment he may need is at best a difficult job. With the handicaps and lack of support they encounter, the agencies handling such youngsters for the most part can only make a rough attempt at treatment and rehabilitation.

Community Support

For example, more than half the counties in the United States offer no probation service for delinquent children. A juvenile court judge cannot do very much for a boy or girl if the court lacks a trained probation staff and competent community workers to supervise the children placed on probation and to help them adjust themselves.

In addition, each year thousands of young people are held in jail while the police or court make up their minds what to do with them. A

large number of our jails are unfit for any sort of human occupation. The Federal Bureau of Prisons has been able to authorize use for adults of less than one-fourth the more than 3,000 city and county jails it has inspected. The effect of placing a frightened, insecure, and impressionable young boy or girl in a filthy cell among the casual population of some of our jails can well be imagined. Yet it happens every day. Communities are failing to provide proper facilities for those delinquent children who require temporary detention.

A catalog of failures and reasons for failure that would stretch on to great length could be compiled. But the point has been made: If community agencies are to be counted on for offering adequate treatment to young delinquents, they must be given adequate support. These agencies don't know all the answers, but they are often successful under most difficult circumstances. Given more and better trained personnel and proper physical equipment, they can do a far better job than they are presently doing. If they were given the opportunity to study methods and results, major improvements in treatment and results might be expected.

As to prevention of future delinquency, the challenge is a tremendous one. Needless to say, it involves every agency in the community.

The best way to prevent children from becoming delinquent would seem to be to make their home and community life attractive, and socially and emotionally satisfying to them. Most of the delinquent children known to our juvenile courts are from broken and economically insecure homes. Many are members of minority races that suffer economic and social restrictions and discrimination. Yet there are many also that come from well-to-do families which have been able to offer educational and other advantages to their children which families less well off economically may lack. Lack of parental understanding, of warm parent-child relationships, or of satisfactory living arrangements or group relationships in the community often seems to be at the root of the delinquent behavior of such children. With all these contributing factors, then, and with no single factor that can be isolated as the unique cause of delinquency, it is apparent that our programs of prevention must have many facets. In these, health agencies have an important role.

Any real attempt to prevent asocial or delinquent behavior must begin early, and must be based on thorough understanding of the phases of a child's emotional and social development and the factors in family and community life that affect it. Studies of large groups of known delinquent children by Drs. Sheldon and Eleanor Glueck have shown that although the majority of these children did not become officially known as delinquents until the period of adolescence, at least half of them had histories of delinquency extending back to their eighth year or earlier.

Influence of Health Worker

In this realm of prevention, public and voluntary health services can make great contributions, particularly through child health and mental health programs. Their influence here can be exerted early and through many channels. Some contacts will be direct with families; others, indirect, through joint community activities with other agencies and individual workers.

The direct contact for public health workers ordinarily occurs in maternity clinics, child health conferences, schools, community health centers, and in similar activities. Doctors, nurses, and other health specialists see practically all children and their parents, at one time or another, in private practice or in health clinics. They see them most frequently when the children are still in their formative years. Some of these meetings are admittedly brief. There may not be time to discover deep emotional problems that might be troubling a parent or a child. The public health nurse may have more opportunity and more time to learn from the mother when she visits in the home, or from the teacher in school. But, if child health services are well conducted, time will be found to make important contributions to the emotional, as well as the physical, well-being of a child. As Dr. Benjamin Spock pointed out for the fact-finding group on health services at the Midcentury White House Conference, even in fleeting contacts, doctors, nurses, nutritionists, and other specialists have real opportunities to help make parents feel proud and confident and eager to gain understanding of their child and to help make a child feel that someone is interested in him and understands him, that here is someone to whom he can turn for help if need be.

Indirectly health experts often influence a child's growth and development through the contacts they have with persons in the community other than the parents. For adolescent children this may be even more effective than working with the child's parents or even with the child himself. Often a teacher, a recreation leader, a social worker, a church worker, a club leader may have the most influence on such a child. A health expert with knowledge and understanding of a boy's or girl's problems in growing up and with skill in handling individual situations may be able to reach far more children by working with teachers, for example, than he could by contact with individual children.

Mental Health Clinic

Among the public and private health agencies well fitted to offer this kind of educational service is the child guidance clinic or community

mental health clinic. The basic staff of this kind of clinic usually consists of a psychiatrist, a psychologist, and a psychiatric social worker. These are people who could conduct discussion groups, give lectures, write simple material for distribution. But too few of our mental health clinics actually do offer this kind of preventive service to other community agencies; too few, indeed, are equipped to handle the demands for help with delinquent children. In fact, many communities—and even some entire States—have no such clinic even for the treatment of individual children. This is a serious lack in any community, but it is particularly serious when a juvenile court judge needs the help of a psychiatric diagnosis in planning treatment for a child.

Every effort should be made to increase the number of child guidance clinics so that their facilities may be available to all juvenile courts and institutions offering treatment to delinquent children. Community health workers can be influential in getting community action of this sort.

Community health workers can help with other problems that confront workers in the juvenile delinquency field. There are the mentally defective delinquent children who may be sent to training schools for delinquent boys and girls because the schools for care of mentally defective children are not equipped to meet their needs if they commit acts contrary to law. They should not be mixed up in training schools with delinquents whose mental development is normal. So, too, epileptic children should not be committed to training schools. The problems of young unmarried mothers whose babies are born while they are in training schools also demand close attention by health workers. Health officers may have powers to condemn detention facilities, even jails, when they are unsanitary firetraps.

Improved Housing

Another possible activity of health services that relates indirectly to the prevention of juvenile delinquency is the improvement of housing. Here is a place where health, welfare, education, and housing authorities and voluntary organizations can combine their activities and

be of great influence. In many cities, the health department is in charge of housing inspection—to see that people are not living in unsafe or unsanitary quarters.

As a positive measure related to this work, some health departments and other interested groups encourage citizens to improve their own neighborhoods by their own efforts. Groups of citizens working together can go far in providing play and recreation space; cleaning up littered vacant lots; making gardens out of back-of-the-house eyesores; painting inside and out, and thereby creating new and better relations with their neighbors; and providing new opportunities for recreational activities for neighborhood groups or gangs of children. In some instances, of course, a neighborhood may be so run-down that nothing short of total reconstruction will suffice. But, however it is accomplished, a change for the good in the appearance of a neighborhood is usually a change for the good in the life of the children of that neighborhood.

Focus on Problem Families

At a recent meeting in New York of representatives of health agencies, Dr. Thomas Dublin, executive director of the National Health Council, pointed out that health problems and social adjustment problems occur quite commonly in combination. Dr. Dublin referred particularly to the findings of the St. Paul, Minn., study made in November 1948 by Community Research Associates—it is published as "Community Planning for Human Services." The study found that a group of less than 7 percent of the city's total number of families was absorbing 46 percent of the community's health services and 55 percent of the community's adjustment services offered by correctional, mental hygiene, and case-work agencies. The results of other studies lend substance to this finding.

These groups of "problem families" in our communities offer a focal point for work not only of the health agencies but also of all our social welfare, educational, and law enforcement agencies. Why these families have such knotty problems and why they continue to have them even after great amounts of money and

energy have been expended in their behalf are questions that have baffled students of our social and economic life. Contributions to our knowledge of causes of family breakdown will, we hope, bring to light factors in the causation of juvenile delinquency. Prolonged and multi-professional types of social research, both basic

and applied, must go forward to help us sort out the more significant factors from the less, and allow us to understand the influence of social and cultural as well as of economic factors that apparently play such important roles in the warping of the lives of many children and young people.

In Departmental Periodicals . . .

OCCUPATIONAL HEALTH

Health Hazards and Health Examinations

Are shoe-fitting fluoroscopes a health hazard? The May 1953 issue of *Occupational Health* quotes excerpts from a report on radiation exposure in New York State shoe stores. Sample findings and conclusions are: Shoe-fitting fluoroscopes were used only in stores selling children's shoes. . . . The growing child is known to be unusually susceptible to radiation effects. . . . Technical evaluation of the design, maintenance, shielding, and operation of the equipment revealed wide variations in exposure to radiation from different machines—even in machines made by a single manufacturer. . . . Education of the parent and the shoe clerk is essential. . . . The major hurdle is to keep shoe stores under proper surveillance so as to provide adequate protection for the shoe clerks and customers.

The industrial use of X-ray, fluoroscopy, and radioactive isotopes is no longer uncommon. Dr. Mitchell R. Zavon, in listing current industrial uses of radiation, suggests that the industrial physician consider the sources of hazard to which the worker may be exposed, one of which, ionizing radiation, "has become an increasing hazard not be-

cause of decreased regard for the possible danger involved but rather because of the increase in potential exposure."

The Industrial Nurse

The first nurse was employed in industry 50 years ago. Today, there are 14,000, but most have been in industry only a year. Many industrial nurses are excluded from active participation in industrial safety programs, contends Myrtle Montgomery who also asks: How can the industrial nurse recognize the medical importance of the complaints she treats when so often she is caught in the emergency demands of the first-aid room? The average industry assumes she is qualified to aid in preventing diseases and injuries, to aid in keeping employees well, and to educate them in good health, safety, and hygiene. Also, management sometimes places her in a position of unwittingly practicing medicine by expecting her to reduce medical case frequency costs in the absence of supervising physicians.

Occupational Health is issued monthly by the Division of Occupational Health, Public Health Service. \$1 a year (\$1.25 foreign mailing), 10¢ a copy, from the Superintendent of Documents, Washington 25, D. C.

Psychiatric Referrals for Delinquent Children

By GEORGE E. GARDNER, Ph.D., M.D.

THE PSYCHIATRIST feels that whenever the situation surrounding the delinquent child at the moment—his reality situation—does not account for the child's antisocial behavior, his behavior probably has roots in some internal conflict, and the child probably needs psychiatric help. If the delinquency just doesn't make sense either from the standpoint of the act itself or from the standpoint of the seeming lack of necessity on the part of the child to act in that manner, or from both standpoints, the delinquency looks suspiciously like a neurotic act.

This general definition is as significant in the great number of cases it excludes from the psychiatrist's concern as in the small number of cases it indicates need special help.

Types of Cases

On the basis of this definition, let us list a group of specific cases which are seen from time to time and on which both the psychiatrist and the juvenile court judge can agree. The list is tentative, is based on clinical observation, and does not arise from any elaborate all-inclusive theory about the fundamental nature of juvenile crime.

Dr. Gardner, director of the Judge Baker Guidance Center in Boston, presented this paper in more detail to the conference of the Surgeon General, Public Health Service, and the Chief of the Children's Bureau, with State and Territorial health officers, State mental health authorities, and representatives of the State hospital survey and construction agencies on December 9, 1952. Dr. Gardner is also editor of the American Journal of Orthopsychiatry.

The sex offender. Children brought to court for lewd practices, heterosexual, homosexual, or other abnormal sex activity have been referred to the psychiatrist ever since the latter has concerned himself with delinquent problems. The psychiatrist is occasionally confronted with cases where, because of some experience in the child's early life, other crimes, notably stealing, have become linked to the drive for sexual gratification. The only hint I know that may be of value to the judge and his associates in detecting such an emotional hookup is the senselessness of the act or suspicions about the role of the child's associates.

The runaway child who has committed no other offense. The child who runs away may be running from some intolerable home situation characterized by abuse, maltreatment, hunger, extreme deprivation. If so, the reality situation alone may account for his behavior, and no psychiatric treatment is necessary. However, the court and the psychiatrist have seen so many instances where the child has not run away in the face of the most inhuman treatment from parents, foster parents, and siblings that both the judge and the psychiatrist should be suspicious of some internal conflict when dealing with the runaway. It is my opinion that all runaways should have the benefit of at least a few interviews with the psychiatrist before we ascribe the act to the reality situation alone and thus content ourselves with merely changing the external forces surrounding the child.

Truancy unassociated with other delinquency in a child of normal intelligence. The child who has the innate ability to advance grade by grade with his fellows but refuses to attend school probably absents himself because of some

personality defect. He is unhappy and probably is so not because of some superficial difficulty with a particular teacher or classmate. He should have help to appreciate and re-evaluate his own problems.

The solitary delinquent. The child who steals or commits other offenses alone should be referred for psychiatric treatment. Because we know that children almost invariably steal with one or more children as partners, we are suspicious of the personality makeup of those few children who steal alone, and thus, we feel that at least a psychiatric investigation should be made. This refers principally to cases where the theft is committed outside the child's own home.

The child surrendered to the court for stubbornness. A child who confines his antisocial behavior, aggression, and unmanageableness to his home probably should be studied by the psychiatrist. A thorough investigation of the intrafamilial reactions as they affect him and in turn determine his behavior is needed. This presupposes a program of study and treatment that may extend to other members of the family.

The delinquent of superior intelligence. Since the formulation and widespread use of standard measures of intelligence, we no longer believe that delinquency is due solely to mental incompetency or to a moral degeneration which is attributable to lack of intellect. On the contrary, we know that most delinquents have average intelligence as measured by age level tests. Frequently, boys of definitely superior intelligence with an intelligence quotient above 115 appear before us. We feel that psychiatric investigation and treatment are indicated for all. Perhaps this is due to a persistence of the obverse of our notion that crime should not exist in the presence of superior ability, or perhaps we are moved by our feeling that here is a boy whose contribution to society may be outstanding if we can but straighten him out. Whatever may be our true motivation in these referrals, it would seem that the nonattainment of mature social standards in a boy of superior intellect is probably due to an emotional factor, preventing him from incorporating adult standards and principles. Hence, we refer him for psychiatric treatment.

Cases where the possibility of organic brain

damage, psychosis, convulsive disorder, or feeble-mindedness exists. Postencephalitic cases and children suspected of congenital or acquired syphilitic infections should be referred to the psychiatrist, who can by examination establish or rule out these conditions and outline the best medical or medico-educational program to be followed.

From observation of delinquents appearing before the court, I estimate that 5 to 7 percent of all court cases would fall into one or more of these categories. This may appear to be a very small number of delinquents referable to the psychiatric clinic, but these, except for the last group, are cases referred for psychiatric treatment, not for diagnosis only, and they do not include the cases involving stealing. The need for facilities to determine accurately which children do need treatment, including psychiatric treatment, is a serious one.

Clinical Conference

Let us hold a psychiatric clinic on three cases all charged with stealing, the most frequent delinquent offense. These cases are cited to emphasize the varying psychiatric needs of delinquent children. They demonstrate a gradient which runs from cases where the detrimental external factors almost alone can account for the delinquency to those expressions in behavior, as in the third case, that seem to have no reference whatsoever to present economic or social inadequacies. In considering these cases, we can discern the relative psychiatric treatment needs or their absence.

A CLASSICAL CASE

Frank at 13 is before the juvenile court for the eighth time, on a fourth charge of stealing. He steals money or anything convertible into money, using it to buy candy, attend movies, treat his friends. He steals alone or with others. He has already been in a correctional school for a year.

Frank lives with his mother, maternal grandmother who is blind and feeble, 5 sisters, and 3 brothers in a poorly furnished 6-room apartment in a fairly poor residential area.

The father has been before the courts 20 times in the past 20 years on charges of assault and battery, drunkenness, stealing, nonsupport, and threatening

his wife. The mother has been in court once for adultery. One older brother has been in juvenile court 14 times and twice in reform school. His charges were breaking and entering, larceny, malicious destruction of property, and truancy. Another brother has been in juvenile court twice for truancy and for larceny.

Frank's mother claims that her mother and the older daughters supervise the children in her absence, although supervision is apparently slight. The mother was separated from her husband 8 months ago. Sometimes there is not enough to eat.

Frank occasionally attends the local community house and church. He enjoys football somewhat but spends his time when at home reading comic books and crime magazines. He hangs around undesirable areas of the city.

Frank entered kindergarten at 5, repeated the first grade, and is now repeating the eighth. His marks are mainly C's and D's. He is occasionally truant or absent.

An observer at a local boys' club sees Frank as an "extremely thin, dirty, and unkempt appearing boy" but quiet, cooperative, and a good competitor, appearing to like athletics although lacking the physical qualifications for rugged, competitive work in the gymnasium.

Frank himself gives no reason for his behavior except that he gets in with the wrong boys. He adds that all boys in his neighborhood steal and that it was unfortunate he was caught. He repeatedly asserts his good intentions but finds he is unable to carry them out. He blames only himself.

Here is the classical case of delinquency arising in a home and community devoted to delinquent behavior—a broken home, poor economic conditions, mother working, little or no supervision of children, father a drunkard and criminal, mother known to the courts, and two delinquent brothers. Presumably, the role of neurotic strivings is minimized in importance by the more or less expected rational response to such admittedly adverse social and parental relationships. Obviously, only an intensive psychotherapeutic approach would reveal the primary gains so well overshadowed. The failure of repeated attempts at rehabilitation through manipulative procedures emphasizes that there are cases of stealing where the irrational, the patternized-repetitive—almost

compulsive—features are on the surface nonapparent and seem to be nonoperative as the all-important portion of the atypical behavior.

SUPERIOR INTELLIGENCE

Charles, 15, is before the court on four complaints of breaking and entering. At 10, he broke into an empty shed, but charges were never pressed, and the case was dropped.

Family history reveals that his parents had a stormy marital career. The father was convicted of a series of thefts and sentenced to prison when the boy was a baby. When Charles was 5, the father was paroled but was sentenced for 20 years after breaking the parole and is still in prison. The mother had difficulty in making ends meet, and moderate deprivations existed. She has always worked, and the boy has been supervised by relatives or friends. When Charles was 6, she divorced her husband and subsequently remarried.

Charles is now repeating the eighth grade. He repeated the seventh. This is his fourth year in junior high school. On the revised Stanford-Binet intelligence test, Charles has a mental age of 17 years, 11 months, and an IQ of 124, indicating superior intelligence.

A review of Charles' stealing episodes reveals that he acquired no money, nor did he receive any of the stolen goods which were taken by the other boys involved. He said he didn't want them. Each instance of stealing was in the company of other boys, all known to Charles to have juvenile court records. Charles never stole from home.

Charles does not want an education but wishes to work in the merchant marine because "they are a bunch of hoboes. I like them. There are no bosses. You can go anywhere you want to go when you want to go."

His only school interest is in art work. He says, "I draw cartoons." When asked for a sample sketch, he draws a cigarette-smoking, tough-looking man wearing a striped shirt with a turtle-neck collar. The man has a patched face and wears a derby hat. Charles calls him a cartoon character. He has no cartoon plot, but has many pictures and will bring them in. When we try to arrange for art classes, he says, "They probably make you draw things you don't want to." When asked if his cartoon is a sad, happy, or funny character, Charles replies, "He is a tough guy, but he is an all right one underneath." He brings in more cartoons which are pictures of

thugs and men with beaten-up faces. One scene depicts a man who has hung himself in jail, he says. Other pictures show prize fighters in various fighting positions.

His companions are inevitably those with court records. He walks 2½ miles from home to play with a boy on probation, and on the way passes many schoolmates who have never been in trouble. He has nothing against the latter but wants to play with boys who have been in trouble.

Charles wants a part-time job, not only because he feels it is a way of finally breaking away from school but also because he wants to earn money for his mother to give her some of the fun she has missed. It will also show his stepfather that he can contribute to the mother's support too.

We find a subtle combination of actual deprivations in early life and neurotic strivings expressed in stealing and allied delinquent acts. The all-consuming drive behind the boy's delinquency seems to be that he feels he must be a criminal like his father, or that he is not to succeed where his father failed. He deliberately tries to destroy himself in the community by his delinquencies, in school by an educational block, and his heart is set upon a vocation that will enable him to be a bum. His drawings bear out his ambitions and his fears in relation to this drive.

Other facts demonstrated that these self-directed tendencies toward failure and destruction were secondary to aggressive tendencies directed toward the father.

INSTINCTUAL DRIVES

Albert exemplifies the extreme end of our comparative scale of boys who steal in that the secondary material gains seem to feature little or not at all as motivating factors, and the neurotic ones seem to be all-powerful.

Albert is 16. His parents can supply the needs and luxuries of a boy of his age in his community. His father died when Albert was 5, and his mother remarried when he was 10. Albert has superior intelligence and is now in the third year in high school despite having been removed from several schools because of stealing.

When he was 8, his mother discovered clothes in his room taken from her closet. She scolded; he seemed upset; and she assumed the problem

dropped. Periodically, Albert has broken into neighborhood houses and stolen women's clothes.

On interview, Albert says, "I say I will stop, but the next day I do it. I've been taken out of schools because of it. I began stealing women's clothes when I was 6 or 7 years old. I just liked to get dressed up in this thing, and mother caught me in it, and she stopped me. I had the door locked. She took it away and hid it. Later, I found it again, dressed up in it, and she caught me again. I cried and put on my own clothes. Then it stopped for about 3 years. It started again as I finished the sixth grade. I suddenly got this urge again to wear women's clothes."

Little comment is needed to emphasize the obvious neurotic elements in this case which stands in contrast to the other 2 cases of stealing, each of the 3 taking its proper place along a scale of increasing psychiatric importance. In addition, it is easy to understand where the primary neurotic gains in such a case are uppermost—even to the seeming exclusion of secondary or material gains. In such cases manipulative procedures or changes in the environmental (economic or social) setup would have no effect whatsoever on the impulse to steal. Only insight derived from self-study under guidance offers hope for a redirection of these instinctual drives.

Psychiatric Needs

From this brief survey, we can make certain hypotheses:

1. All delinquent children need treatment of some kind whether medical, psychiatric, educational, placement, supervision—or new shoes and clothes and proper food.

2. All delinquent children do not need psychiatric treatment.

3. Although all delinquent children may not need intensive psychiatric treatment, all delinquent children need a psychiatric diagnosis first of all to determine accurately whether psychiatric treatment is needed. Psychiatric diagnosis means more than a test of intelligence and a physical examination.

Because of the shortage of trained psychiatrists and of the even more acute shortages of trained child psychiatrists the minimal diagnostic and minimal treatment needs of delin-

quent children are not being met. Needed are more psychiatric training facilities and the placement of psychiatric personnel within the court structure once they are trained.

Other needs in this area of psychiatric treatment are equally serious:

Residence centers—not detention homes—where adequate care and thorough medical, psychological, and sociological studies can be made, are needed for preliminary diagnoses of children who cannot be kept at home during their preadjudication period.

Schools and hospitals geared to long-term intensive residence treatment of delinquent

boys and girls are desperately needed. We particularly need foster home and residence treatment centers and programs for delinquent girls and for Negro children of both sexes.

Only under such conditions can we be assured that the proper medicosocial treatment programs for delinquent children will even approximate the best form of comprehensive child care.

NOTE: Portions of this paper have appeared in G. E. Gardner's "The Psychiatrist's Role in the Treatment of the Delinquent," Yearbook of the National Probation Association, 1940: and in his "Primary and Secondary Gains in Stealing," *The Nervous Child*, vol. 6, October 1947.

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Studies on Dental Care Services For School Children

— *First and Second Treatment Series, Richmond, Ind.* —

By GEORGE E. WATERMAN, D.D.S., and JOHN W. KNUTSON, D.D.S., Dr.P.H.

IN A COMPREHENSIVE analysis (1) of a dental survey of school children in Hagerstown, Md., Klein, Palmer, and Knutson distinguished between the accumulated and annual increment of dental needs. They concluded that the basic problem of caring for caries in the teeth of school children is that of caring for the annual increment.

The purpose of this report is to provide actual performance data on the accumulated and maintenance dental care needs of school children.

The Richmond study was a cooperative project of the Indiana State Board of Health, the city of Richmond, and the Public Health Service. Beginning December 23, 1946, it extended over a 5-year period.

The project was designed to give dental care services to all school children enrolled in kindergarten through the ninth grade, provided treatment was requested by their parents.

Dr. Waterman, assistant chief of the Division of Dental Public Health, Public Health Service, directed the dental research care program in the Richmond, Ind., schools. He is presently engaged in promoting and developing the use of auxiliary personnel in dental schools and in the dental profession.

Dr. Knutson, Assistant Surgeon General, is the chief dental officer of the Public Health Service.

Richmond was chosen for this study primarily because it provided a group of between 4,000 and 6,000 school children for a treatment and followup program, and because the project had the full approval and cooperation of the Indiana State Health Department and of dental societies and school authorities at both the State and local levels.

The city is a fairly typical midwestern community of about 40,000 people, 98 percent of whom are white and native-born. The total enrollment for all schools—kindergarten through senior high school—was 6,929 at the beginning of this study.

Situated near the eastern border of Indiana, Richmond is a railroad center and a major distribution terminal for the rich farm produce of eastern Indiana and western Ohio. It also has several small and medium-sized industries.

Clinical Facilities and Personnel

Dental clinics were set up in each of Richmond's 16 elementary and junior high schools: 14 public and 2 parochial. Wherever possible, school authorities provided attractive clinic rooms with good lighting and ventilation.

Two modern standard dental units and chairs were available to each dentist. For each 2 chairs there was 1 dental instrument cabinet containing duplicate sets of instruments. The type and arrangement of equipment, and the

provision of adequate auxiliary personnel enabled each dentist to work from a seated position at all times. These working conditions reduced the dentist's fatigue and helped to improve the quantity and quality of his services (2, 3).

The clinics varied in size from 4 chairs for schools of 300 children or less to 6 chairs for the larger schools. Two or three clinics operated at one time. As dental treatment was completed in one school, the staff dismantled equipment and packed supplies for transportation, and in less than a day later the equipment was in use again in the next school.

Personnel for the study project included between 3 and 5 dentists, a dental health educator, a secretary, and a dental hygienist to give prophylaxis and topical fluoride treatments. In addition 1 clerk was assigned to each operating clinic, and an average of 1½ dental assistants was provided each dentist.

The 5 dental assistants employed at the start of the project underwent 10 weeks of intensive training at the Naval Dental School in Bethesda, Md. They in turn helped to train assistants added to the staff later during the study.

Inservice training was provided for the entire staff once every 3 months by 1 of 7 specialists in various phases of pedodontics and in the efficient use of auxiliary personnel.

Clinical Routine

Dental record cards were prepared for the entire school population from census sheets provided by the teachers of each grade. Teachers issued "request for treatment" slips to all pupils with instructions to return them signed by a parent or guardian, indicating whether or not they wanted the child's dental care provided in the school clinics.

The dental care program was divided into four consecutive treatment series. A treatment series consisted of dental examination of the total enrollment, kindergarten through junior high school, and completed treatment of all children whose parents requested treatment.

Since the majority of dental defects in any group of children results directly from dental caries, this report is concerned principally with

caries prevalence and the treatment services required to correct carious defects.

This report is limited to the first and second treatment series.

Examination

Complete dental examinations of all children were conducted in each school. Examinations were made with a No. 4 plain mouth mirror and sharp No. 5 double-end explorers. X-rays were used whenever there was any doubt about clinical diagnosis.

The following information was recorded in examination and treatment records maintained for each child during each treatment series:

Number of primary and permanent teeth erupted and unerupted.

Number of teeth missing because of extraction.

Number of teeth missing due to other causes.

Number of roots remaining.

Number of filled and unfilled carious teeth and the surfaces involved.

Number of filled teeth and the surfaces restored.

Number of hypoplastic teeth.

Observations were made on all teeth present in the mouth. Teeth recorded as carious were those which showed actual cavities, no matter how small, as well as deep pits and fissures in which the explorer hung and penetrated with pressure.

A dental assistant recorded the information on the record cards in code to facilitate transfer to punch cards for processing and analysis. A serial number was assigned to each child for the duration of the study project. A master card index system was maintained to simplify reference to a child's previous dental record.

Treatment

Once the examinations had been completed, clinical treatment was given to all children whose parents had signed consent slips. A few days before treatment was started in a particular school, the children heard a brief talk by the dental health educator, who explained the importance of early and adequate dental care. He told why the clinic was coming to the school

and urged those receiving treatment in private dental offices to do so regularly. This introduction to the clinic program helped promote understanding and friendly cooperation among the children, the teachers, and the clinic staff. During actual treatment, the children received chair-side instruction in oral hygiene.

Clinics were operated on a year-round basis with appointments for treatment continuing during vacations and holidays. Young children were treated in the early forenoon and early afternoon, with treatment periods limited to 15 to 30 minutes. The late morning and late afternoon appointments were usually reserved for the older age groups. Their treatment periods varied from 20 minutes to 1 hour.

Extractions were generally avoided during a child's first dental experience. Efforts were made to complete all operative treatment in the teeth of at least 1 mouth quadrant during a single sitting. Fillings were polished as the sittings progressed.

The types of treatment included:

Permanent fillings (amalgam and silicate cement).

Restoration of fractured anterior teeth with full and partial crowns.

Vital partial pulpectomies of permanent and primary teeth.

Root canal therapy of permanent anterior teeth.

Treatment for periodontal diseases.

Prophylaxis.

Topical fluoride applications.

Polishing of fillings.

The amount and type of treatment given each child were noted on the record cards. Each dentist and dental hygienist recorded all of their clinical services on daily work sheets. At the end of each 10-day working period, these sheets were combined in a biweekly report showing an accurate running account of services performed during the study project.

First Treatment Series

A total of 5,523 children between 5 and 16 years of age, representing 96 percent of all Richmond children in kindergarten through the 9th grade, were given dental examinations. A total of 4,569, or 84 percent of the group, re-

quested and received dental treatment (see table 1).

Caries Prevalence

Since this report is concerned mainly with dental care service, baseline and performance data are limited to those children who took part in the clinical care program.

The average annual increment of decayed permanent teeth, estimated from the difference in prevalence rates at individual ages, was 1.1 teeth per child. The total estimated annual increment was 5,100 decayed permanent teeth.

To establish an adequate means of measuring and expressing workload for this dental care study, all teeth requiring fillings, whether or not they had previously been filled, are counted as "carious." Also counted as carious are teeth for which extraction is indicated. Approximately 75 percent of the children had 1 or more decayed permanent teeth. There was a total of 18,542 decayed teeth involving about 30,000 surfaces.

The age specific DMF (decayed, missing, and filled) rate of permanent teeth increased from 0.31 at age 5 to 11.47 at age 15 (see table 2 and figure 1). The average 15-year-old child had 9.42 decayed teeth, 1.72 missing teeth, and only 1.60 filled teeth.

More than 13 percent of the children had 1

Table 1. Age distribution of all children examined, by patient status, 1st and 2d treatment series, Richmond, Ind.

Age last birthday	1st treatment series			2d treatment series		
	Patient status		All children	Patient status		All children
	Clinic	Private		Clinic	Private	
All ages	4, 569	954	5, 523	4, 797	798	5, 595
5	565	105	670	479	69	548
6	528	110	638	574	79	653
7	507	92	599	555	64	619
8	440	89	529	524	74	598
9	495	88	583	503	63	566
10	422	75	497	457	80	537
11	358	69	427	426	70	496
12	359	72	431	347	55	402
13	370	78	448	364	88	452
14	334	86	420	331	93	424
15	161	72	233	195	47	242
16	30	18	48	42	16	58

or more missing permanent teeth, and only 17 percent had 1 or more filled permanent teeth.

More than 34 percent of the primary teeth examined were found to be carious. The average 7-year-old had 13.58 primary teeth, of which 5.11, or more than 38 percent, were decayed (see table 3). Only 9 percent of the group had 1 or more primary teeth which had been filled prior to the first treatment series.

Treatment Provided

Since the first evidence of dental caries in permanent teeth is closely associated with the beginning of school attendance—at age 5 or 6—a school dental program of the type described here is ideal for caring for the annual increment of defects in permanent teeth. Such a program cannot, however, insure annual or maintenance care of primary teeth, inasmuch as caries usually begins to accumulate in these teeth before age 3. Therefore, during the first treatment series, when the main concern was to care for the accumulated defects of the permanent teeth, primary teeth received only emergency, or very selective, treatment.

Ninety percent of the clinical program group received complete dental care during the first treatment series; and 70 percent of the children

Figure 1. Dental caries prevalence in permanent teeth, first treatment series, Richmond, Ind., ages 5-16.

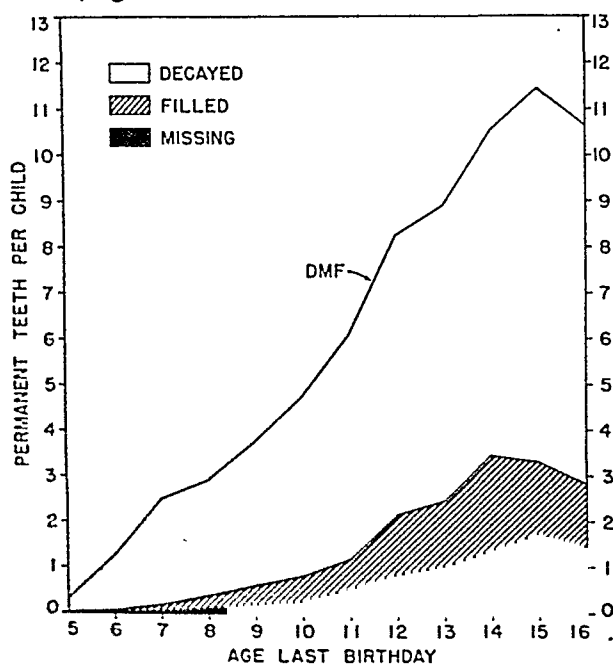


Table 2. Dental caries prevalence in permanent teeth of children, 1st and 2d treatment series, Richmond, Ind.

Age last birthday	Number of teeth per child						DMF
	Carious	Filled	Carious and/or filled	Missing			
				Total	Ex-tract-ed	Ex-trac-tions indicated ¹	
1st treatment series							
5-16 ² ----	5. 08	0. 83	5. 58	0. 61	0. 37	0. 24	5. 95
5-----	. 31	. 00	. 31	. 00	. 00	. 00	. 31
6-----	1. 23	. 04	1. 26	. 00	. 00	. 00	1. 26
7-----	2. 38	. 14	2. 48	. 03	. 02	. 01	2. 50
8-----	2. 68	. 28	2. 88	. 09	. 03	. 06	2. 91
9-----	3. 45	. 42	3. 71	. 18	. 06	. 12	3. 77
10-----	4. 24	. 56	4. 60	. 25	. 14	. 11	4. 75
11-----	5. 51	. 67	5. 90	. 51	. 20	. 31	6. 10
12-----	7. 10	1. 31	7. 79	. 84	. 47	. 37	8. 26
13-----	7. 41	1. 46	8. 30	1. 00	. 61	. 39	8. 90
14-----	8. 36	2. 11	9. 67	1. 34	. 88	. 46	10. 54
15-----	9. 42	1. 60	10. 30	1. 72	1. 16	. 56	11. 47
16-----	8. 83	1. 40	9. 73	1. 43	. 90	. 53	10. 63
2d treatment series							
5-16 ² ----	2. 87	3. 32	5. 59	0. 48	0. 43	0. 05	6. 02
5-----	. 17	. 00	. 17	. 00	. 00	. 00	. 17
6-----	1. 05	. 06	1. 10	. 00	. 00	. 00	1. 10
7-----	2. 01	. 45	2. 35	. 00	. 00	. 00	2. 35
8-----	2. 16	1. 32	3. 13	. 03	. 02	. 01	3. 15
9-----	2. 38	2. 08	3. 89	. 08	. 06	. 02	3. 95
10-----	2. 78	2. 67	4. 83	. 19	. 15	. 04	4. 98
11-----	3. 55	3. 17	5. 95	. 25	. 20	. 05	6. 15
12-----	4. 65	3. 85	7. 71	. 55	. 44	. 11	8. 15
13-----	4. 50	4. 87	8. 45	. 69	. 64	. 05	9. 09
14-----	3. 80	6. 79	9. 49	1. 01	. 95	. 06	10. 44
15-----	3. 80	7. 20	9. 87	1. 28	1. 18	. 10	11. 05
16-----	3. 64	7. 38	10. 19	1. 62	1. 48	. 14	11. 67

¹ Also included in "Carious" and "Carious and/or filled."

² Average of the rates for ages 5-16.

treated received fillings in 1 or more permanent teeth. More than 11 percent of the children had at least 1 permanent tooth extracted.

A total of 16,015 permanent teeth were filled, at an average rate of 4.20 teeth per child for all age groups. The average 15-year-old had 7.20 teeth involving 11.69 surfaces restored (see table 4).

Selective treatment of primary teeth included 2,898 primary teeth filled, and 3,341 extractions.

In addition to teeth filled and extracted, a total of 367 pulps were capped, and 151 vital

partial pulpectomies were performed on permanent and primary teeth.

Each child received at least 1 dental prophylaxis. Topical fluoride applications totaled 12,329; a serious attempt was made to provide each child with a series of 4 topical fluoride applications.

Dentist Man-Hours

There was an average of 4.3 dentists on duty during the first treatment series, or a ratio of 1 dentist to 530 children treated per year. This dentist-staffing average is based on a full 65-hour, biweekly period for all dentists assigned to the project during the first treatment series with no deductions made for administrative work, vacations, illness, training, and so forth.

Dentist man-hour rates were determined from the total clinic time actually worked by all dentists during the 24 months of the first treatment series. The number of dentist man-hours required to complete treatment of each child in the first round was 2.88. The average number of permanent and primary teeth treated per dentist man-hour was 2.17. This number included 1.50 permanent teeth filled.

Second Treatment Series

During the second treatment series, a total of 5,595 children, 93 percent of all Richmond children in kindergarten through the 9th grade, were given dental examinations. A total of 4,797, or 86 percent of the group, elected to receive treatment in the school clinics (see table 1). This number included 1,688 who had not been enrolled in school during the first treatment series, largely kindergarten and 1st grade children.

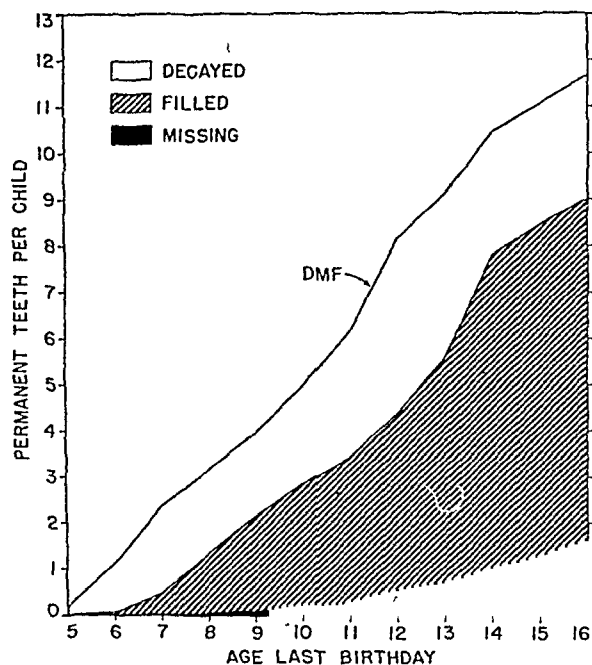
Caries Prevalence

Approximately 68 percent of the children had 1 or more decayed permanent teeth. There was a total of 12,523 decayed teeth, about 6,000 less than in the first treatment series.

The average annual increment of decayed permanent teeth during the interval between the beginning of the 2 rounds was 1.19 teeth per child.

The average number of untreated carious teeth per child at age 15 was 3.80 compared to

Figure 2. Dental caries prevalence in permanent teeth, second treatment series, Richmond Ind., ages 5-16.



9.42 in the same age group in the first treatment series (see table 2 and figure 2). The average 15-year-old now had 7.20 filled teeth whereas 24 months earlier the average had been only 1.60 for the same age group. The average DMF rates were essentially the same for all age groups in both series.

Only 167 permanent teeth were indicated for extraction in all age groups, compared to the 815 which had needed extraction during the first series. Approximately 52 percent of the children now had at least 1 filled tooth as compared with only about 16 percent at the beginning of the initial series.

There was a slight decrease in the number of carious primary teeth. The average 7-year-old had 4.75 carious primary teeth, compared to 5.11 for the same age group in the first treatment series (see table 3). This relatively slight reduction in the number of carious primary teeth can be attributed to the limited treatment provided during the first treatment series, plus the enrollment of a new crop of children in the kindergarten and first grades. During the second treatment series, however, 24 percent of the children had at least 1 filled primary tooth, compared to only 9 percent in the first round.

Table 3. Dental caries prevalence in primary teeth of children, 1st and 2d treatment series, Richmond, Ind.

Age last birthday	Number of teeth per child			
	Carious	Filled	Carious and/or filled	Extractions indicated ¹
1st treatment series				
5-16 ²	2.31	0.22	2.47	0.37
5	4.75	.37	5.02	.32
6	4.91	.52	5.28	.51
7	5.11	.43	5.41	.89
8	4.53	.48	4.90	.86
9	3.84	.47	4.21	.77
10	2.26	.17	2.37	.47
11	1.33	.11	1.38	.35
12	.59	.13	.67	.12
13	.33	.01	.34	.08
14	.07	.01	.07	.02
15	.04	.00	.04	.01
16	.00	.00	.00	.00
2d treatment series				
5-16 ²	2.09	0.53	2.48	0.25
5	4.62	.40	4.90	.24
6	4.83	.94	5.52	.41
7	4.75	1.28	5.70	.53
8	3.96	1.44	4.98	.51
9	3.21	1.10	4.06	.53
10	2.09	.74	2.64	.42
11	1.03	.34	1.28	.18
12	.34	.09	.40	.07
13	.14	.03	.15	.04
14	.04	.01	.04	.02
15	.03	.00	.03	.00
16	.02	.00	.02	.00

¹ Also included under "Caries" and "Caries and/or filled."

² Average of the rates for ages 5-16.

Treatment Provided

Complete dental care was given to 98 percent of the clinical program group with 69 percent getting at least 1 permanent tooth filled. Only 2 percent of the children required any extractions.

A total of 12,354 permanent teeth were filled, at an average rate of 2.83 teeth per child for all age groups, compared to 4.20 in the first round of treatment. The average 15-year-old had 3.47 teeth restored, compared to 7.20 for the same age group 20 months earlier (see table 4).

Since the bulk of the accumulated needs had been cared for during the first treatment series,

it now becomes possible to devote more time to treating defects in primary teeth. The number of primary teeth filled rose from 2,898 in the initial round to 5,569 in the second series.

Aside from fillings and extractions, there was no substantial change in the type or amount of other dental treatment services.

Dentist Man-Hours

There was an average of 3.9 dentists on duty during the second treatment series, or a ratio of 1 dentist to 743 children treated per year. The number of dentist man-hours required to complete treatment of each child in the second round

Table 4. Dental treatment to permanent and primary teeth of children, 1st and 2d treatment series, Richmond, Ind.

Age last birthday	Number of teeth per child					
	Permanent teeth			Primary teeth		
	Filled	Filled surfaces	Ex-tracted	Filled	Filled surfaces	Ex-tracted
1st treatment series						
5-16 ¹	4.20	6.65	0.24	0.48	0.88	0.61
5	.27	.38	.00	1.38	2.51	.40
6	1.15	1.63	.00	1.31	2.52	.69
7	2.16	3.38	.02	1.21	2.23	1.21
8	2.46	4.00	.08	.98	1.79	1.33
9	3.01	4.84	.12	.49	.84	1.26
10	3.81	6.19	.21	.23	.39	.96
11	4.85	7.59	.30	.08	.13	.63
12	6.23	9.68	.36	.03	.05	.48
13	6.75	10.40	.41	.02	.03	.26
14	6.52	10.27	.43	.00	.01	.08
15	7.20	11.69	.45	.02	.03	.02
16	5.93	9.70	.53	.00	.00	.03
2d treatment series						
5-16 ¹	2.83	4.28	0.05	0.88	1.65	0.45
5	.18	.28	.00	2.84	5.23	.38
6	1.15	1.18	.00	2.80	5.21	.65
7	2.08	3.40	.02	2.43	4.66	.91
8	2.18	3.56	.01	1.44	2.75	.92
9	2.29	3.76	.04	.72	1.28	1.03
10	2.77	4.26	.05	.24	.43	.77
11	3.58	5.34	.05	.04	.07	.42
12	4.72	6.81	.05	.01	.01	.20
13	4.63	6.93	.08	.01	.02	.09
14	3.72	5.69	.12	.01	.03	.04
15	3.47	5.33	.10	.00	.01	.03
16	3.21	4.79	.05	.02	.05	.00

¹ Average of the rates for ages 5-16.

was 1.86. The average number of permanent teeth treated per dentist man-hour was about the same as in the first series. There was an increase, however, in the amount of treatment provided per dentist man-hour for primary teeth: 0.61 teeth filled as compared with 0.31. The second treatment series was completed in 20 months.

There was a reduction of 1.02 dentist man-hours in time required to complete treatment of each child. This drop may be attributed to the lower prevalence of carious teeth due to dental treatment, and improved operating and clinical procedures.

The reduction in completed dentist man-hours per child would undoubtedly have been greater except for the constant influx of children who had had little or no previous dental treatment.

Summary

An average of 4,600 school children in kindergarten through 9th grade were given dental examinations and complete dental treatment during the first 2 treatment series of the Richmond, Ind., dental care study project.

The first treatment series was designed to care for the accumulated dental needs of the group. Primary emphasis was placed on caring for defects in permanent teeth.

The second treatment series, which started 24 months after the beginning of the first, was designed to treat the increment of defects occurring during that 24-month period, and to provide more complete care for the primary dentition.

Before the first series, only 17 percent of the children had had any permanent teeth filled. This figure rose to more than 52 percent at the start of the second series.

At the beginning of the second series, it was found that the average 15-year-old had 3.80 unfilled carious teeth, compared to 9.42 in the same age group at the start of the first series.

Only 167 permanent teeth were indicated for extraction in all age groups in the second series, compared to 815 needing extraction during the first round of treatment.

The number of dentist man-hours required to complete treatment of each child in the first and second rounds was 2.88 and 1.86, respectively. This represents a reduction of 1.02 dentist man-hours, or 35 percent, for each child.

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Adult Guidance Center, San Francisco

By McCLAIN JOHNSTON, M.D.

WITH THE RECOGNITION of chronic alcoholism as a public health problem, more interest is being shown in public education on the subject, more legislation to establish and operate clinics and hospitals for alcoholics is being passed, and medical, sociological, and psychological research in this field is increasing.

Ten months after publication of a report on the extent of alcoholism in San Francisco, the city board of supervisors made a lump sum appropriation of \$50,000 for the fiscal year 1949-50 to establish an inpatient facility for treating men charged with and convicted of drunkenness. The pilot clinic opened July 15, 1949, in the hospital ward of the men's division of the San Francisco county jail. A psychiatrist, a psychiatric social worker, and a clerk-stenographer comprised the staff. During the 20½ months the pilot clinic was in operation, medical and psychiatric treatment was given to approximately 200 patients. The pilot clinic was under the direction of the City and County of San Francisco Department of Public Health.

There were definite disadvantages in attempting to treat alcoholics in a jail setting. It was felt that the problem of alcoholism could be handled better if the treatment and punitive programs were completely separate. Funds for both inpatient and outpatient facilities were not available. However, an additional \$35,000 was added to the original budget of \$50,000 to establish and maintain a voluntary

outpatient clinic which would be apart from the jail. On April 2, 1951, the Adult Guidance Center opened and the pilot clinic in the jail closed.

Organization

The Adult Guidance Center is open 12 hours a day, 6 days a week, to accommodate patients whose work schedules might conflict with clinic attendance. A psychiatrist-director, 4 psychiatrists, 3 psychiatric social workers, 2 nurses, and 3 stenographers make up the staff. The 4 psychiatrists and 1 of the nurses are on a half-time basis. All services are free. The clinic is a bureau of the City and County of San Francisco Department of Public Health. The budget for the fiscal year 1952-53 is \$75,000.

The psychiatrists on the staff interview and evaluate new cases coming for treatment, make progress notes on the active cases who receive medical treatment only, and see cases in psychotherapy. The duties of the social workers fall into three major areas: intake-interviewing on new cases, liaison with other agencies about individual cases, and the carrying of cases in psychotherapy. The nurses administer medication, and make progress notes on cases receiving medical treatment only, when the psychiatrist on duty is interviewing a patient.

Two staff meetings are held weekly: one is for case presentation; and the other is an administrative meeting where general policy, procedural changes, and clinic problems are discussed. Each social worker has a weekly supervisory conference with the director to discuss problem cases or to review psychotherapeutic interviews.

Dr. Johnston, a psychiatrist, is the full-time director of the Adult Guidance Center, a bureau of the City and County of San Francisco Department of Public Health.

Admission

Each new patient must live in the city and county of San Francisco. He must be "dry" for 24 hours prior to admission. He must feel that he has a drinking problem. Under this criterion, we require only that the patient come to the clinic voluntarily with the realization that his drinking is causing some problem in his day-to-day living. Not all patients are chronic alcoholics in the usual sense of the expression. Many state they are not alcoholics at all. The criterion of a 24-hour "dry" period was set because the clinic is not equipped to handle the acute emergencies which severe intoxication presents. Rare cases of this type are taken to an emergency hospital. One bed is maintained in the clinic for the occasional patient with convulsions.

Patients are referred to the center from Alcoholics Anonymous and from all psychiatric clinics in the city. Referrals are also made by private physicians, the courts, municipal social agencies, the State bureau of vocational rehabilitation, the city-county hospital, and the county medical society.

Our patients represent a fair cross section of the city's population according to social and economic levels. The majority are skilled and semiskilled laborers and white-collar workers. Women have consistently represented 25 percent of the admissions since the opening day of the clinic.

Procedures and Services

On arrival, each new patient gives his name and address to the receptionist. The patient is next introduced to the psychiatric social worker. In his own way he describes his problem during an unhurried interview with the social worker—lasting from 45 minutes to an hour. Specific information for statistical evaluation is elicited at the end of the intake interview if the patient has not spontaneously provided the answers during his conversation with the social worker. Before the interview closes, the medical and psychiatric facilities available at the center are discussed with the patient. The social worker attempts to ascertain what type of treatment will be most helpful.

If a new patient manifests no interest whatsoever in group or individual psychotherapy, and if he has had no prior contact with Alcoholics Anonymous, then the functions of Alcoholics Anonymous are explained and a referral may be made to that organization.

The social worker writes a short summary of the intake interview just after seeing the patient. This summary is given immediately to the psychiatrist on duty, who reads it, and then interviews the patient. The drinking problem and the patient's general emotional status are evaluated, and again the various forms of treatment are discussed. On the first day of their contact with the clinic, most new patients are started on medical treatment which consists of adrenocortical hormones and vitamin preparations. Group and individual psychotherapy are discussed, but the first appointment with the therapist—either a psychiatrist or a social worker—is usually deferred for 2 or 3 days in most cases.

Patients are told that if they are interested in either group or individual psychotherapy they should mention their interest to the psychiatrist on duty on their return in the next few days for injections. At that time, an appointment will be made with a psychiatrist or a social worker if individual psychotherapy is requested; if group psychotherapy is desired, the patient's name is listed for one of the group meetings. When an appointment for individual psychotherapy is made with a social worker, the patient is almost always referred to the person who conducted the original intake interview.

The psychiatrist briefly checks the general physical status of the patient, and he may give him a physical examination if it seems indicated. Whenever physical disease is found or is suspected, or if a medical checkup appears necessary, the patient is referred to his family physician or to one of the city or university outpatient clinics.

The Adult Guidance Center believes that a temporary deferment in appointments is often helpful in attempting to elicit motivation for psychotherapy. Our past experience has been that many new patients, particularly patients who are weak and physically rundown from a recent "drunk" or those patients who exhibit the

usual symptoms of hangover, will request medical treatment, individual psychotherapy, and group psychotherapy. Then, in a day or two when they are closer to par, their motivation for psychotherapy would greatly decrease, and they would state that probably the hormones and vitamins would be sufficient.

On January 1, 1952, when the clinic staffing was completed, the policy that all patients be offered either individual or group psychotherapy became effective. In some cases, a patient may receive both individual and group psychotherapy. Prior to that date, only selected cases were offered psychotherapy. Although the budget appropriation provided for full staffing earlier, the acquisition of adequately trained psychiatric social workers and psychiatrists was not completed until then.

Individual psychotherapy is dynamically, that is psychoanalytically, oriented. The patient is given an opportunity to attempt to work through his emotional problems with the help of the psychiatrist or psychiatric social worker. Since all patients at the clinic have a drinking problem, with the possible exception of some of the relatives, the psychotherapy is naturally concerned with this symptom, although no specific attempt is made to limit therapy to this one aspect of psychopathology.

The clinic does extend psychiatric help to the significant member or members of the patient's family when this seems indicated.

Each one of the psychiatric social workers has had considerable experience in psychotherapy. Seldom is there a differentiation between psychiatrist and social worker as to the handling of a particular case. Individual psychotherapy is conducted by the psychiatric social worker under the supervision of the clinic director.

Group psychotherapy is also conducted along dynamic lines with the group leader, a psychiatrist, occasionally giving interpretations, focusing on a particularly significant point in the session, and at times acting as an arbiter. Generally, the group sets the pace. The leader supplies factual information when it will be helpful. The groups are small ranging from 3 to 9 persons and are separated as to sex. Each group meets once a week. The duration

of individual interviews is approximately 50 minutes. Group sessions last approximately 75 minutes.

Followup

Prior to a major policy change in August 1951, patients were given medication by injection and the frequency of patient appointments was gradually decreased. When a patient had returned physically to par and did not exhibit too much nervousness or tension, he was told that the clinic thought he was doing well and that he had probably achieved the maximum benefit from the injections. He was then asked to return in about a month for a followup interview.

On the basis of experience, this method of followup was not effective. Returns for interviews were few. With the rather sudden discontinuance of clinic contact, many patients resumed drinking. Lacking was the supporting effect of frequent interviews over a long period of time.

Patients are now seen more frequently in the early days of their treatment program, and the decreasing frequency of contact is more gradual. The philosophy of continued contact is discussed with each new patient early in his treatment, and he is told that even though he will eventually be seen only once a month, the clinic would like him to come indefinitely. Definite appointment dates are set. No patient is automatically discharged by the clinic. Patients in individual or group psychotherapy naturally attend more frequently.

In a reasonable period of time the psychiatric social worker attempts to follow by telephone any patient receiving medical treatment only who has missed an appointment. A reasonable period is determined on the basis of frequency of appointments. The tenor of the telephone contact is that the clinic has noticed the patient has missed his appointment—what can be done to help him? This procedure seldom provokes the guilt and hostility generally felt in a situation of being checked on.

It depends on the individual patient in psychotherapy whether a letter followup is used after he has missed one or more appointments. In any case the door is left open and the patient is in no way pressed to return. It is the opinion

of the staff that more active and forceful methods of followup are not directly proportional to a greater number of patients maintaining sobriety or even to longer periods of sobriety in individual cases.

Field followup has never been possible because of the small size of the social service staff. But aside from staff limitations, close followup in the home might not be desirable for the alcoholic patient. Actually, too close surveillance may operate against beneficial results.

Educational Activities

Ever since the inauguration of the clinic, staff members have given talks about the program before Alcoholics Anonymous, the Red Cross, regional groups of psychiatric social workers, and local and State public health meetings. The Adult Guidance Center has participated in panel discussions on psychiatric facilities in San Francisco during National Mental Health Week. Material concerning the clinic's functions has been sent to all social agencies, psychiatric clinics, and other referring organizations.

Research and Evaluation

To evaluate the overall results of treatment for a large group of chronic alcoholics is extremely difficult. Even sobriety, the most objective criterion, must be qualified whenever, it is discussed, since many patients who may have been sober only a few weeks or months during clinic contact have in the past been steady drinkers. With others, even though continued sobriety has not been attained, the conflict in their family relationships has decreased.

A less striking factor, but a meaningful index, is the increase in the number of days patients are spending at work because of less frequent "binges" and shorter recovery periods with clinic treatment.

A most important factor, of course, is the actual existence of a clinic to which sick patients can turn for help. This alone gives immeasurable hope and reassurance to patients and their families and friends.

Since August 1951, when the policy was initiated to have patients keep continued contact

with the clinic, the staff has been able, at any time, to enumerate the active and inactive patients.

As of February 28, 1953, 2,435 patients had been accepted for treatment, and 31,591 visits had been made to the clinic.

From August 20, 1951, through February 28, 1953, 1,573 patients sought treatment; 25 percent of these were women. The 1,573 patients were divided into 4 groups:

<i>Group</i>	<i>Percent</i>
A—Active and "dry"-----	29
B—Known to have resumed drinking-----	12
C—Patients with whom clinic has lost contact-----	51
D—Discontinued clinic treatment for reasons other than drinking-----	8
Total-----	100

The clinic gives treatment to a large number of patients. At present, clinic visits average 65 a day. When the 3 criteria of clinic admission are met, treatment is begun almost immediately. No appointments need be made by telephone, and there is very little, if any, waiting for intake interviews. This immediate availability of treatment and the lenient eligibility criteria are undoubtedly important factors in the large percentage in group C. An additional factor is that this figure includes those with only 1 clinic contact. The clinic feels the 29 percent in group A is a reasonable return for the expenditure of funds and hours but naturally hopes to improve this figure. Although it is reasonable to assume that some of the patients in groups C and D are still "dry," adequate followup is not possible for several reasons: small size of the social worker staff, large number of patients, and frequent changes of address. Even though adequate personnel for followup were available, the frequent changes of address would make this activity extremely difficult.

Even the patients in group B, who are known to have had at least 1 slip, attained an average of 66 days sobriety prior to their resumption of drinking.

Since August 20, 1951, 21.1 percent of the patients have participated in either individual or group psychotherapy, or in both: 12.1 percent received at least 1 hour of individual psycho-

therapy in addition to the intake interview; 8.9 percent participated in group psychotherapy; and 0.1 percent participated concurrently in individual and group psychotherapy. The remaining 78.9 percent of the patients have received medical treatment only.

The average number of hours of psychotherapy to date is:

<i>Group</i>	<i>Average hours</i>
A-----	11½
B-----	6
C-----	6¼
D-----	6

Approximately 3 months after the clinic opened, plans were made for a controlled group study to evaluate the benefits achieved with adrenocortical hormone and vitamin therapy. Although laboratory facilities are not available for any extensive pharmacological deter-

minations, the effect of the drugs on various physical and emotional symptoms and the duration of sobriety can and are being evaluated.

The comparative effectiveness of medical treatment with or without group or individual psychotherapy is in the process of assessment, although it is often difficult, if not impossible, to state specifically the factors leading to a patient's improvement. The clinic is interested in the comparative speed of recovery from acute alcoholic symptoms with the use of adrenocortical hormones and various vitamin preparations. The results of group and individual psychotherapy can be evaluated in terms of the individual development of healthier and more adequate personality defenses leading to more mature, realistic behavior. In most cases this realistic behavior leads to the state and maintenance of sobriety.

Gamma Globulin for Poliomyelitis Is Distributed

Initial supplies of gamma globulin for use against paralytic poliomyelitis were released by the Office of Defense Mobilization and shipped to State and Territorial health officers by the Public Health Service in mid-May.

Under policies established by the Office of Defense Mobilization, about 57 percent of the total national supply of immune serum globulin available for poliomyelitis inoculations is being distributed. An additional 33 percent is for use in mass prophylaxis where epidemics are most severe. The remainder, about 10 percent, will be assigned for research and emergency purposes. Concerning the allocation plan, the Office of Defense Mobilization notes "it is expected that further modification and supplementation will be necessary from time to time in the light of experience and existing circumstances."

The first release of the agent was not sufficient to provide State health departments with their complete basic allocations. Subsequent shipments are being made automatically, without further request from health officers, until distribution of the entire basic allocation has been accomplished.

Evaluation of Sanitation Programs in a City-County Health Department

By J. A. SALVATO, Jr., M.C.E.

Objective evaluation of the environmental sanitation programs conducted by State and local health departments serves many purposes. It can provide the basis for integrating, adjusting, and balancing the programs. It can be used to demonstrate the need for obtaining and retaining competent personnel. It aids the administrator of the programs in determining whether available personnel are being utilized to do the work considered most important. It can provide facts for supporting program recommendations and policy determinations.

To be of value, evaluation studies should consider workload, work done, quality of the work, and its effectiveness. The data assembled must, of course, be reliable, and they must be interpreted in the light of thoroughness and competence of the inspections.

Continual evaluation of environmental sanitation programs has been carried on in the Erie County (N. Y.) Health Department for the past 4 years. It has proved to be effective in showing which programs need more inspection time, which are receiving too much inspection time, and which are not producing results.

Uniformity of Inspection

It must be recognized that inspections can be made with varying degrees of completeness, depending upon such factors as amount and kind

of supervision, training and experience of personnel, policies and customs of the health department, and inspection procedures. Inspection work and accomplishments can be summarized and the various environmental sanitation programs compared, however, only if all inspections are conducted with the same degree of thoroughness. Therefore, a basic requirement for evaluation studies is the establishment of uniform quality inspection based upon accepted public health principles. This necessitates the development and proper use of satisfactory compliance guides, including inspection forms or checklists, for each activity inspected and the provision of continuing in-service training for inspectors and supervisors.

The inspection-compliance forms prepared by the Michigan Department of Health in cooperation with the Kellogg Foundation; the "Recommended Guide for Satisfactory Operation of Camps" developed by the Poughkeepsie district office of the New York State Department of Health, the Public Health Service's recommended "Ordinance and Code Regulating Eating and Drinking Establishments" and its recommended "Milk Ordinance and Code," and "A Proposed Housing Ordinance," prepared by the American Public Health Association Committee on the Hygiene of Housing incorporate useful compliance guides. Manuals and guides, of course, are not a substitute for intelligent and mature judgment, but they are indispensable administrative aids which, with constant supervision, will help maintain uniform quality enforcement of a sanitary code.

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Figure 1. Sample tabulations from the statistical summary form used for recording inspection data in the Erie County Health Department.

Activity	Fourth quarter	Total, 1952
1. Multiple dwellings—3 or more families:		
a. Number of places on record.....	7,083	7,083
b. Number inspected of total on record—original for year.....	319	3,180
c. Number of inspections made.....	2,284	9,391
d. Number of places with deficiencies.....	316	1,653
e. Number of places eliminating all deficiencies.....	350	1,079
2. Camps—recreational, trailer, tourist:		
a. Number of places on record.....	129	129
b. Number inspected of total on record—original for year.....	10	129
c. Number of inspections made.....	93	715
d. Number of places with deficiencies.....	19	106
e. Number of places eliminating all deficiencies.....	2	83
f. Number of permits issued.....	9	98

Workload and Work Done

In analyzing the work of a department, inspection data should be organized so that the status of every activity under supervision is readily given. For this purpose, the Erie County Health Department developed a special statistical summary form. At first completed monthly, this form is now completed quarterly. It shows not only the work accomplished during the reporting period but also a cumulative total for the year.

Two examples of the tabulations on the statistical summary form are shown in figure 1. Breakdowns similar to these may be used for all activities under routine supervision—rooming houses and hotels, nursing homes, public places, schools, swimming pools, pasteurizing plants, dairy farms, slaughter houses, restaurants, public water supplies, and so forth. A modification of these breakdowns is needed for special program activities, such as rodent control, nuisance inspections, stream pollution studies, private water supply and sewage disposal inspections, legal actions, and plan reviews.

The sum of the "Number of places on record" (fig. 1, a) for each activity is the workload of the bureau in connection with places for which it has routine responsibility. The total workload is determined by adding to this figure

the number of special program services provided.

The "Number inspected of total on record—original for year" (fig. 1, b) indicates what part of the work has been done and what part remains to be done if each place is to receive an annual inspection. This information is very valuable in planning future work. For example, the multiple dwelling tabulation shows that less than half the structures on record were inspected by the end of the year. If all structures are to be visited annually, more emphasis will have to be placed on the inspection of this activity.

The "Number of inspections made" (fig. 1, c) tells where inspection time is being spent and the average number of inspections each place has received. This information may indicate a need for redirecting inspection time or for greater field supervision. It must of course be considered in relation to the results produced. In the camp tabulation for example, all places were inspected during the year about $5\frac{1}{2}$ times. This figure might be considered high, but the high percentage of places eliminating deficiencies tends to confirm that the time was well spent.

A need for redirecting inspection time, however, was found at the end of 1949 when the rec-

ord of the number of inspections made in each activity revealed that 75 percent of the general sanitation time in Buffalo was being spent investigating complaints, work which is not usually productive of lasting improvements. Inspection of multiple dwellings on a planned program basis was not possible under these circumstances. By deliberate redirection of inspection time toward multiple dwellings, it was possible over a 3-year period to inspect every multiple dwelling on a planned followup basis for the first time in the history of the city. In 1952, only about 45 percent of the housing inspector's time was spent investigating complaints, and this percentage may be reduced further when a modern minimum standards housing code recommended by the health department is adopted.

The "Number of places with deficiencies" (fig. 1, d) and the "Number of places eliminating all deficiencies" (fig. 1, e) show the progress being made and the condition of the places under supervision. If a place removes all deficiencies and on subsequent inspection is found to have slipped back, it would again be listed as a place with deficiencies. When progress is unsatisfactory, additional inspection, supervision, or review of the program may be indicated. The key may be a lack of direct supervision, poor quality of supervision, departmental policy, lack of promotional opportunities, or poor morale. Interpretation or definition of deficiencies, of course, may vary with the individual, unless adequate inservice training is given and satisfactory compliance guides are developed and used.

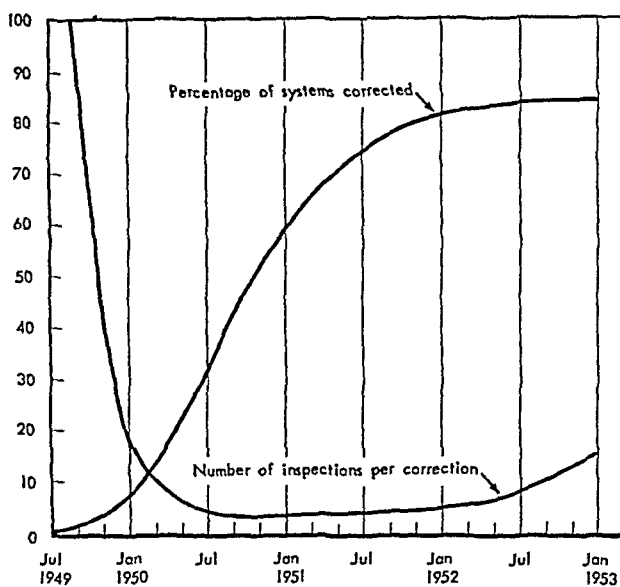
When places with deficiencies removed are compared with the number of inspections, an indication is obtained of the number of inspections per place corrected. The point of diminishing returns can thus be seen (fig. 2).

The "Number of permits issued" (fig. 1, f) shows those places under supervision which on inspection were found in compliance with the existing regulations, assuming that annual permits are issued only after report of satisfactory compliance is received.

Frequency of Inspection

The amount of time spent in making original inspections can be expected to vary widely from

Figure 2. Percentage of individual systems corrected and number of inspections per correction in a community sewerage survey, Erie County, N. Y., 1949-53.



the "average," dependent upon the size of the establishment, problems, missionary work done, and so forth. An original inspection requires a complete inspection report and letter confirming recommendations.

Reinspection calls for reviewing previous correspondence and corrections made, completing an inspection checklist summarizing some 25 to 50 specific items, answering identification questions, listing specific deficiencies, noting steps taken in the field to correct the deficiencies, and writing practical recommendations for correcting specific deficiencies. Major deficiencies and recommendations for corrections are confirmed in writing to the responsible person by administrative personnel. With experience and proper training the inspector can do much of the paper work, with resultant increased efficiency and accuracy of reporting.

The conditions found at the time of the last inspection should determine the time and frequency of reinspection. For some activities, an average of 3 inspections per year is needed to maintain a satisfactory operating level of sanitation. Other activities, such as rooming houses, may require only 2 inspections per year after the third or fourth year of continuous supervision, whereas private sewage

disposal systems may require 6 or 8 inspections per correction or per installation.

Inspection Supervision

Review of inspection reports by trained, experienced, and competent sanitary engineers or sanitarians directly responsible for specific activities will aid in evaluating the field work from day to day. Incomplete reports, a high percentage of "no violations," sketchy explanation of the deficiencies observed, and no recommendations, or vague and nonspecific ones, readily become apparent. An unusually large or small number of inspections made in a day may indicate whether or not an inspector is trying to do a good job.

The ratio of supervising engineers or sanitarians to inspectors will depend upon such factors as the difficulty of the work, its newness, and the degree of progress already made in obtaining satisfactory compliance. In a going housing or restaurant program, the ratio may be 1 supervisor to 6 or 8 inspectors; in a farm labor camp or recreation camp inspection program, it may be 1 to 4; a special housing appraisal or stream pollution survey may require a ratio of 1 to 2. Since environmental sanitation activities are of a wide range of difficulty, broad generalizations are usually incorrect.

Production

Information useful in the planning and management of an operating program may be obtained from the inspection data assembled on the statistical summary form, as follows:

$$\text{Average number of inspections per man-day} = \frac{\text{Number of inspections}}{\text{Number of man-days}}$$

$$\text{Average number of hours per inspection} = \frac{\text{Number of productive hours per day}}{\text{Number of inspections per man-day}}$$

The number of inspections is given on the statistical summary form. The number of man-days can be determined from payroll and attendance records; and the number of productive hours per day, by subtracting hours spent in office routine from the total working hours.

An example will illustrate the procedures for these determinations. During 1952, approxi-

mately 25,000 inspections were made in the cities of Buffalo and Lackawanna and 10,000 in the remainder of suburban and rural Erie County, not including inspections of public water supplies, sewage treatment plants, food, and food-selling places. There were 5,067 man-days on duty in the cities and 2,777 in the remainder of the county. The net average annual work year was 241 days. Analysis of a typical day showed the following "nonproductive" work: 1 hour in writing reports, discussing special problems, making appointments, receiving inservice training, and so forth; 1/2 hour in getting to the first assignment, and 1/2 hour in maintaining good public relations; therefore, of a 7-hour workday (exclusive of the lunch hour), 5 hours were spent in "productive" work. Thus:

$$\text{Average number of inspections per man-day (cities)} = \frac{25,000}{5,067} = 4.9$$

$$\text{Average number of inspections per man-day (county)} = \frac{10,000}{2,777} = 3.6$$

$$\text{Average number of hours per inspection (cities)} = \frac{5}{4.9} = 1.02$$

$$\text{Average number of hours per inspection (county)} = \frac{5}{3.6} = 1.39$$

These figures, which may be determined for a total program or for one activity, have many uses. Annual comparison of this information on an overall and activity basis will indicate trends and may show where special attention is needed. The figures also can be used to determine the approximate number of personnel needed to carry out existing inspection responsibilities or new program activities; an adjustment must be made, of course, if the activity is of more or less than "average" difficulty. For example, an analysis of a general sanitation bureau showed that it had an annual workload of 17,685 places, and that 11,271 of them were inspected during the year a total of 35,145 times. Each place was therefore inspected an average of 3.1 times. The places not inspected (17,685-11,271) amounted to 6,414. If an average of 3.1 inspections is required for reasonable control, 19,883 (6,414×3.1) additional inspections would be needed. Since this work is in the city of Buffalo, where experience has shown that 4.9 inspections can be made per man-day, 4,058 additional man-days

(19,883 ÷ 4.9) or 17 men (4,058 ÷ 241) would be needed, in addition to supplementary supervisory staff. Of the 6,414 places not inspected, however, 2,164, or one-third, represent barber and beauty shops, the inspection of which is being deemphasized. Hence the number of men needed might be reduced by one-third.

Efficiency

The inspection data may also be used in evaluating the efficiency of the sanitation bureau or of a particular program. It is first necessary to have determined by an impartial expert the amount of time that should be required to make each type of inspection. Multiplying the number of inspections actually made by the time required for each type will give the total time that should have been spent to do the work reported. The ratio of the time required to the time actually spent will give the percentage efficiency. It is not inconceivable that an efficiency of 200 or 300 percent may be found where quantity rather than quality has been emphasized.

The following calculations illustrate the procedure for determining the percentage efficiency.

The amounts of time required to make inspections in three activities, adjusted to allow for travel time, were determined separately by an impartial expert, and the total number of hours theoretically required to make the inspections reported in these activities was calculated as shown in the table. The actual time spent in making 25,000 inspections in Buffalo during 1952 was 5,067 man-days, as previously determined. Thus, the actual time spent in making the 19,640 inspections in these three activities, which represented 93 percent of the total, was 4,720 man-days. Since the number of productive hours per day was 5, the total number of hours spent in the field was 23,600 (4,720 × 5). The efficiency of the inspection work in Buffalo in 1952 was therefore 83 percent (19,640 ÷ 23,600).

In 1951, the efficiency of the inspection work in Buffalo was 76 percent; in 1950, approximately 87 percent; and in 1949, approximately 140 to 200 percent. During 1949, the first year

Theoretical time required to make inspections reported in 3 activities, Buffalo, 1952

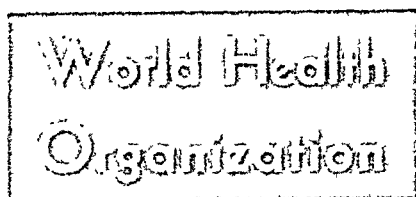
Activity	Number of inspections made	Time required per inspection ¹		Total time required (hours)
		Minutes	Hours	
Rooming houses:				
Original inspection--	1, 359	65	1. 08	1, 470
Reinspection-----	1, 644	50	. 83	1, 365
Multiple dwellings:				
Original inspection--	3, 180	65	1. 08	3, 440
Reinspection-----	6, 122	50	. 83	5, 090
Complaint investigation-----	11, 021	45	. 75	8, 275
Total-----	23, 326	-----	-----	19, 640

¹ Determined by an impartial expert.

of actual operation of the city-county health department, inspections were not based upon any uniform inspection report form or checklist. During 1950 and 1951, reorganization, inservice-training, full-time operation of the Public Health Service-New York State-Erie County sanitary inspectors training school and the development of uniform inspectional procedures received first priority. These efficiency figures show the changing emphasis from quantity to quality inspection. Such figures must, of course, be interpreted with caution, as figures in themselves may be valueless.

Summary

The development of satisfactory compliance guides and inspection report forms and the provision of inservice training and adequate, competent program supervision are essential for inspection data to be significant. Environmental sanitation programs and activities in different health departments can be compared only if the quality of the work, accomplishments, and supervision are on the same level. Analyses mentioned here are subject to different interpretations dependent upon local conditions. The evaluations are valuable administrative guides which, when properly used, will serve the administrator well.



The National Conference On World Health

A selective report of discussions in Washington, April 6-8, 1953, sponsored by the
National Citizens Committee for the World Health Organization

FROM April 6 through 8, 1953, a National Conference on World Health met in Washington. Its participants primarily were representatives of civic and professional organizations—more than 100 groups sent accredited delegates—called together by the National Citizens Committee for the World Health Organization.

The chairman of the committee's steering group—Frank G. Boudreau, M.D., of the Milbank Memorial Fund—remarked at the conference that "doctors and other public health workers know that health is not something you can hand over to people, like food or money. Health—personal, national, or international—must be worked for, it must be wooed and won. Therefore, it stands to reason that health above all other subjects, needs the understanding and support of the peoples of every country."

It was this line of thought, Dr. Boudreau noted, that prompted WHO to suggest organizing national citizens committees for the World Health Organization. Similar committees now exist in Austria, Canada, and Finland. The United States group grew out of separate explorations by the National Health Council and the American Association for the United Nations. The steering committee,

nucleus of the present National Citizens Committee for the World Health Organization, was authorized by the National Health Council in January of 1951. Now an independent organization, the National Citizens Committee states its purpose is "to acquaint our people with the relationship of public health to the general welfare and peace in all parts of the world community, and to increase appreciation of the importance of international health programs."

The chief responsibility of the Washington conference of April 1953, Dr. Boudreau said, is "to help the steering committee work out the role which the National Citizens Committee should play, and to make recommendations concerning its methods, program content, and the channels through which it should operate."

The real labor of the conference took place in 6 working parties or seminar groups, supplemented by reports and observations by leaders in international health affairs. In advance of publication of full proceedings by the National Citizens Committee, Public Health Reports presents a report of the operations of the World Health Organization, illustrations of WHO/UNICEF cooperative projects, and short quotations from three talks.

The Nature of the World Health Organization

By HENRY VAN ZILE HYDE, M.D.

ON AUGUST 18, 1796, Harman Blennerhassett, writing from New Utrecht, Long Island, New York, to a friend in England, told the following tale:

"Some time last summer, a Yankee, at a little town in the State of Massachusetts, learning the times were mortally sickly at Port au Prince, conceived a scheme of sending there a cargo of—coffins. Those commodities were made up in nests of sizes, from the largest to those for infants and, that no room should be lost, the inner coffins of the nest were packed with cakes of—gingerbread. I have only to add, that the speculation turned out a capital hit—our Yankee having actually returned full freighted with the best West Indies produce, in return for his timber."

On March 17, 1953, 157 years later, a dispatch originating in Port au Prince appeared in the New York Times under the headline: "U. N. and U. S. Help Haiti Fight Yaws—Antibiotic Injections Rapidly Wiping Out Disease Once Infecting 1,000,000."

This dispatch tells the dramatic story of an international cooperative effort to eradicate a disease which is holding back the growth and development of a neighboring nation. It tells of cooperation which involves a number of agen-

cies and governments—cooperation carried on under the inspired and inspiring leadership of the World Health Organization.

Between Blennerhassett's letter of 1796 and the New York Times story of 1953 lies not only the discovery of the causes of infectious disease and their methods of control but also an awakening to the fact that prosperity for all lies in health rather than in disease: in life, rather than in death.

Today, the world reaches out with a helping hand, not with coffins but with trained personnel and with scientific, practical knowledge and skills for the promotion of human health. This is the great purpose of the World Health Organization.

Organization of WHO

The organizational structure of the WHO follows, in general, the simple pattern characteristic of the other specialized agencies.

A World Health Assembly composed of representatives of all the member states meets annually as the governing body of the World Health Organization. It determines the policies, votes the budget, and assesses the members.

An executive board composed of 18 technically qualified persons designated by 18 governments chosen by the Assembly meets twice annually to review the Director-General's budget proposals and to delve into the many matters of policy, administration, and relationships referred to it by the Assembly.

A secretariat, appointed and lead by the Director-General, carries on the day-to-day work of the Organization.

A feature unique in the United Nations structure is the regional organization of WHO.

Dr. Hyde, now chief of the Public Health Service's Division of International Health, formerly was head of the health staffs of the Technical Cooperation Administration and the Institute of Inter-American Affairs. He has served since 1948 as the United States member of the WHO executive board.

"Learning and knowledge are to be gained from our mistakes as well as from our victories. It is to be hoped that from the work that is being done throughout the world in international health it may be possible for some of the less developed countries to avoid some of the mistakes of the more developed countries. Some short cuts may be made, and a great deal of grief can be avoided by learning from mistakes.

"It is important that we all recognize that no group, no culture, no people, has yet found the perfect way of living—not even of providing medical care. There is something to learn from all patterns and there is something to be discarded from all patterns about which we know anything at the present time. There is much to be learned from the attitudes of the so-called underdeveloped countries. Many of them have developed wisdoms that we have hardly ever had or have forgotten. I think no person has worked in international health—and particularly those who have worked in close contact with the people of the underdeveloped countries—who has not gained greatly in terms of his own experience and stature and value of his own community. . . .

"The people of the underdeveloped countries are

very tolerant people, generally. They are willing to absorb the peculiarities of those who come to help them, and some of our customs are very peculiar indeed, from their points of view. It is so easy for us to take for granted that our ways are or should be standard and that if everyone would just do things the way we do them everybody would live happily ever after; there would be no conflicts and everything would be fine. Of course, this is not true. In our own groups and in our own cultures, we also have troubles. We have not yet found all the answers and it would be a very bold person indeed who would go into any underdeveloped country and say: 'You should do as we do and then you will have no more troubles.' Yet occasionally this is the attitude that is taken towards some of the underdeveloped countries. When that does happen the people of those countries are very polite. In effect they say, 'Oh yeah,' and let it go at that. They are far more polite, generally, than we are. They are far more willing to accept our peculiarities than we to accept theirs, and they even try to understand our limitations and make allowances for us."

—Brock Chisholm, M. D.

Director-General, WHO, 1948-53

The World Health Assembly has divided the world into six regions in order to decentralize operations and, to a degree, policy development. In each of these regions there is a regional office and a regional committee. The regional office is headed by a director, appointed by the executive board on the nomination of the regional committee. The regional director reports to the Director-General. The regional committee is composed of the governments of the region. It meets annually to review regional problems and needs and proposed plans and budgets. Program development and budget construction begin at the regional level and finally take form in the Assembly.

Through its decentralization, WHO is brought nearer to the people and to the governments it serves, being more responsive to their needs.

Functions

The World Health Organization exists in order to render service, first, to the world at large and, second, to its individual members—the governments of which it is composed.

Services to the World

There are certain services that must be performed on a world basis if they are to have significance. These services are not new with the World Health Organization. They have grown up during the past half century as the world has become an increasingly more intimate place. They had their origins in the International Office of Public Health, which was founded in 1907, in the Pan American Sanitary Bureau, and in the League of Nations.

Daily from Singapore, throughout the vast reaches of the Pacific, and from Geneva, and over a network reaching Africa, Europe, and the Americas—WHO broadcasts reports on pestilential disease as a guide to shipping and an aid to quarantine officials. In the East, where cholera, plague and smallpox remain a daily concern, this is a service of first importance. We can hope to see an end of this business in our time. But it is not yet. Unnecessary diseases, including the easily preventable scourges of the Dark Ages, are still the daily companions of vast numbers of our fellow men. That fact must weigh heavily on our own consciences, so long as it remains a fact. Meanwhile, WHO must perform those services which limit such diseases and keep them within bounds.

Certain agents important in medicine and public health are used universally. These include antitoxins, serums, vaccines, antibiotics, vitamins, and insecticides. World War I showed the need for the development of international standards in regard to such products. While tetanus antitoxin manufactured in the United States and that manufactured in France were equally effective, they were differently measured and marked because there was no internationally agreed unit of measurement. As a result, soldiers died horribly and unnecessarily, because of errors in dosage. Today within WHO the world has a system of standardization, serving all people everywhere. In the research laboratory in Bethesda, Md., at the bedside in Rangoon, in the jungle field station on the Congo—scientists, medical officers, and native vaccinators speak the same language. In utilizing WHO standards, they understand one another, immediately and distinctly.

WHO serves as the world clearinghouse in the many fields of knowledge which, taken together, constitute "public health." Through panels of experts drawn from the world at large, it keeps itself abreast of knowledge. On occasion, committees of experts, drawn from these panels are brought together to resolve special problems or advise on current issues. Reports of these committees are basic documents in health throughout the world. There are some 50 such reports now dealing with the control of particular diseases such as tuberculosis, schistosomiasis, and malaria; with training and administration;

with broad problems such as environmental sanitation and nursing. The world looks to WHO to keep it reliably informed and up to date.

Services to Members

A new thing in our generation—an area of great hope and promise—is the service that WHO is rendering to its members in the management of their own health problems and in the development of their own health services. It is here that we can see a new future for the billions of mankind. We see, in the distance, man living as man should—clean, healthy, and productive; free and at peace.

There are three elements to this aspect of the WHO work—advice, demonstration, and training.

1. *Advice.* The WHO is prepared to send advisers on any phase of public health to governments seeking such assistance. Such advisory service may relate to the organization and administration of public health on a national basis. An international team sent to Israel, for instance, reviewed the national health service at the request of the Government and made important, far-reaching recommendations. Advisory services may also be highly specialized, as when advisers are sent to Chile in connection with the production of diphtheria and whooping-cough vaccine to be used in a nationwide campaign. Advisers are drawn from the permanent central or regional secretariats or, perhaps more often, on a short-term basis from national and local health services, public and private laboratories, universities and foundations in all parts of the world.

2. *Demonstration.* Carrying advice into the field of practical action, WHO, on the request of governments, conducts demonstrations of modern public health methods. Four WHO demonstrations of malaria control, conducted in widely separated parts of India, created the understanding and popular demand that has led to a nationwide project now being launched with a view to the mass control of malaria in India during the next 3 to 5 years.

In India today there are an estimated 100 million cases of malaria each year. Its control would release some 3 billion man-days of pro-

ductive effort and lift an incalculable burden of human suffering. Last spring I visited the Terai, the great plains at the base of the Himalayas. I was shown a modern 16,000-acre farm which 2 years previously had been a tiger forest. Only through malaria control had it been possible to open up this fertile area which had been unproductive through the centuries. This was an example of what can be done and is being done in many areas of the world. A WHO demonstration team was at work in the Terai and can be credited with giving new life to an area of great potential.

It has been my privilege to visit many countries in which WHO is at work. I have seen its malaria demonstration teams in the foothills of the Himalayas; its tuberculosis teams in Delhi, Karachi, Baghdad, and El Salvador; its maternal and child health teams in Columbia, Egypt, and Najafghar, India. Even a cursory glance through the Director-General's annual report gives a sense of great accomplishment over wide areas of the world. Vital and vigorous projects are under way. It is, indeed, heartening to find the influence of the World Health Organization reaching so deeply into the far parts of the earth. Demonstration teams are planting seeds of knowledge that are growing among the peoples of the world, that are seen and understood in their deep significance by the governments.

3. *Training.* While demonstrating ways and means of attaining progress in health, WHO is assisting in building up a corps of trained men and women, everywhere, to do the job that must be done. During its short career, WHO has awarded 2,608 fellowships for foreign study to physicians, nurses, sanitary engineers, and other technicians. This group, with the thousands trained under the auspices of private foundations and various government programs, are the world health leaders of the future.

To a large extent, WHO owes its own existence to the leadership of men and women who, a generation ago, had similar opportunities for foreign study under the Rockefeller Foundation program.

The WHO training program is not limited to fellowships alone. Teaching missions, regional seminars, visiting lecturers, and other

"I am told and I have observed personally in many countries, that mothers and fathers in the less developed countries love their children dearly. These people dislike illness and suffer pain as much as we do. In the Near and Far East you will see many blind and near blind people on the streets; people with sore eyes, living skeletons engaged in hard work, many, many hopeless cripples. So the survivors of the perils of infancy look forward to lives of sickness and pain, brought to a premature close long before they have lived out the normal span of life. . . . We must face the question as to whether in similar circumstances, we would not be apt to embrace any doctrine no matter how evil, if it gave us hope of relief from sickness, pain, and premature death. One thing we can do, and the quicker we do it the better, is to help the people of the less fortunate countries to clear away the mass diseases, for there can be no economic development, no rise in the standard of living, until this barrier has been removed. We must then go on to help them to develop their material and human resources, and in both of these things the World Health Organization is best fitted of all UN agencies to lead the way."

—Frank G. Boudreau, M.D.

available devices are utilized to build the strength of teaching institutions around the world.

Coordination

The World Health Organization is not working alone. Rather, it is the coordinating force in a complicated structure of many agencies. Under its constitution it is the "coordinating and directing authority in international health work."

There are a number of agencies concerned with various aspects of world health: United Nations International Children's Emergency Fund; United Nations Educational, Scientific, and Cultural Organization (UNESCO); the Food and Agricultural Organization (FAO); the Technical Cooperation Administration (TCA); the Mutual Security Administration (MSA); the Colombo Plan; private agencies

and foundations, industry, churches, and others. Each has its special motivation, its special drives, its own resources, its special values.

It is not strange that the world should be a complicated environment. Certainly a local community is a complicated affair with its several departments of local government, its PTA's, Rotary Club, women's clubs, church groups, chamber of commerce ad infinitum. A concept that the world should be simpler than the town is not a valid one. The job of the World Health Organization is not, as some have proposed, to stand alone and do the whole job of international health. Rather, its job is to mobilize the great forces that are available; to give the lead to us all.

It is doing this. It is increasingly setting the sights for all agencies, pointing up opportunities for social and economic advancement through health improvement. It has brought about jointness of operation in the place of what could have been duplication and waste. Examples of its coordinating activity are found in joint committees with FAO, ILO (International Labor Organization), and UNICEF, and in the holding of coordinating conferences among the operating staffs of the various agencies in the field of health. Such conferences have been held at the country level. They are held regularly in certain regions and have been held at the world level in Geneva.

In February 1953, for instance, a joint staff conference of the TCA health staff in Africa and Asia and the WHO headquarters and regional staffs was held in Geneva. It has led to a depth of understanding and intimacy of relationship which could be attained in no other way.

In health it is fair to say that under the leadership of the World Health Organization the various national and international programs have become, in a very real sense, a single, unified movement with a common goal and common methods of attaining that goal.

During 1952, 12,600 villages, one-third of all the villages in Iran, in which are the homes of some 4 million Iranians, were treated with DDT. The report of the United States Director of Technical Cooperation—the Point IV

"Nations must work together for their common good against their common enemies—violence, poverty, ignorance and disease. We can't take them on one at a time because they are all tied together, and we can't act alone because we're all tied together. The late Justice Holmes said that continuity with the past is not a duty. It is only a necessity. I would say the same of international cooperation. It is not a duty. It is only a necessity."

—Ambassador James J. Wadsworth,
Deputy United States Representative to the
United Nations

program—which contributed substantial sums to this campaign, includes the following statement:

"This campaign against malaria in Iran is a truly international effort. Iran's Ministry of Health, Institute of Malariology of the University of Tehran School of Medical Sciences, the World Health Organization's Malaria Control Advisory Team consisting of a malariologist, an entomologist and a sanitary engineer, and Point IV have all joined in this program in Iran. Cooperation and coordination has been excellent considering the great area of Iran, poor communications and usually bad roads, and other organizational problems of an undertaking as great as this program. The WHO team are 'tops' and to them must go much of the credit for the technological success."

Indeed, international cooperation is a living reality. In the World Health Organization, there is represented something new and fine which has come into the world since the Yankee trader took his profits from "mortally sickly" Haiti. We, as United States citizens, can take a great measure of satisfaction in this change to which we, as a nation and a people, have contributed so much of goods and spirit. We can take pride in America's part in building WHO. We can explain this to our fellow citizens so that they too may find satisfaction in a job well done and worth pushing ever forward.

Two Cooperative Projects of WHO and UNICEF

By S. M. KEENEY

IN ASIA, the World Health Organization and the United Nations International Children's Emergency Fund (UNICEF) work hand in hand on 50 projects in 15 countries in which UNICEF has invested \$20,000,000 in supplies and WHO is supplying 100 professional personnel. These projects range from training projects, in which the main investment is for personnel, to mass campaigns where the foreign technical personnel may be only 5 percent of the project.

Our approach is to keep in mind always that the projects are not those of UNICEF or WHO. We are working together to help governments. It is even more important to remember that both our agencies and the government are merely the means of getting a job done for the people. The people, in fact, must be an essential fourth partner for, unless their cooperation is active, in the long run we shall fail.

UNICEF administratively is a small organization in Asia. We have only about one international staff member for every million dollars. We have one regional office, in Bangkok, Thailand, which covers the projects in the Western Pacific and Southeast Asia WHO regions, together with Pakistan, which falls into the Eastern Mediterranean region of WHO. The reason UNICEF has only one regional office is that it is feasible and much cheaper to handle supply problems for the entire area; WHO must deploy professional people and cannot work over so large an area. Examples will illustrate the cooperation which exists between WHO and UNICEF.

Mr. Keeney is director for the Southeast Asia region—with headquarters at Bangkok—of the United Nations International Children's Emergency Fund.

Yaws in Indonesia

A yaws project in Indonesia began about 3 years ago and has treated to date about 700,000 cases found among some 7 million people. The job is only 10 percent done, for there are at least 7 million cases in the islands among the 75 million population.

UNICEF has made a first allocation of \$1,200,000 and has just voted an additional \$450,000 which will be enough to carry the project at least through 1955. The Government has paid all the local expenses and, beginning this year, will pay for one-third of the penicillin to be used for adults.

Joint Job from the Start

To start the project 3 years ago, WHO sent a specialist to consult with the Government and to make preliminary recommendations. Dr. Thomas Parran of the University of Pittsburgh Graduate School of Public Health confirmed this need in a general study of urgent needs in Asia. Several of us from UNICEF went in to work out the administrative details. From the beginning, it was thus a cooperative job. A full-time foreign clinical specialist and a serologist were maintained for 2 years. The rest of the work has been done by the Indonesians themselves, and in the last year the only international WHO member has been the serologist. This does not mean, however, that the project does not have technical supervision. A statistician was necessary last year for some months to examine the records and to make suggestions for improving them. He did a most acceptable job and is asked to return this year.

The first 2 years' work proved that, even with the very few dollars, it was possible to organize

teams of male nurses who could do a thoroughly acceptable job cleaning out yaws, village by village. The trouble was that there was not even enough nurses. It was therefore determined to bring into the plan eventually all of the polyclinics, of which there are some 1,200 scattered over Indonesia, and to use the male attendant to do the injections under the supervision of the regency physician. Something more was needed, however—someone to find the cases in the villages and bring them together for treatment. This person has only a high school education and perhaps only 3 months' training, but he is carefully picked so that he is acceptable to the village, and he works through the village headman.

This plan was tested under the guidance of Dr. M. Soetopo, a member of the WHO Expert Committee and a leading venereologist in Surabaya. Careful preliminary tests were made to find out whether the system would work at all, how effective it would be, how fast the work could be done, and what the cost would be. The tests were simple, but carefully done, because on that the whole expansion depended.

Bangkok Yaws Conference

Here again WHO came into the picture. These tests were carefully examined in the first International Yaws Conference held in Bangkok March 1952, with 60 specialists in attendance from most countries that have yaws. There was much discussion of the conditions that must be put on work that has to be done with so little medical supervision.

The conference was not satisfied to discuss the papers brought from Indonesia. A special committee of three made a special study on the spot of the methods that were being used. They suggested a number of technical changes that ought to be made, but, in general, gave their hearty approval to the plan and urged that it be expanded to treat at least a million cases a year.

We are now in the midst of that expansion. The whole job is being done by the Indonesians themselves. There is on the spot, however, as country representative from WHO, the previous regional specialist on yaws who regularly consults with the national team leader. In fact,

the team leader, the WHO representative and the UNICEF mission chief work together to develop a sound and feasible administrative plan.

It is still too early to determine the results. The plan is beginning, however, on schedule; almost 100 local units have already been started; and by the end of 1953 the goal is 300. The rate of treatments per month is expected to rise from about 25,000 to at least 50,000 by the end of this year, and to at least 75,000 a month next year. We are still far from the goal, but we are on the way.

BCG Work in India

Largely because of the amount of transport needed, the UNICEF investment in this project is relatively high. The work of the professional staff, however, has been more important in BCG work than in yaws, because the secret of success is, even more than in yaws, that of rapid and effective organization: to assemble millions of children quickly and get the highest percentage of them back to have their tests read.

The beginnings of this work in India and in Asia in general were discouraging. There was considerable opposition, and much educational work needed to be done. Greater obstacles were poverty, the lack of roads, the heat, and the monsoon. It has been found, however, that careful preparatory work does make possible the organization of successful campaigns under every condition except that of civil war, which occasionally holds up matters temporarily.

Against these discouraging beginnings is the record of recent accomplishment in a new type of campaign in Delhi State. The goal was 700,000 children to be tested within a month. All the local health forces available were marshaled, and several teams were brought in from neighboring States. This was partly to recognize good work done in their local States and, as a bonus, to give them a chance to see the capital.

Tests and Vaccinations

Fortunately, the weather was good and the children relatively easy to gather. The most effective method, long since worked out, was

to provide a little music, and all the school bands in town were marshaled. Where a band wasn't available, an energetic drummer with a double-headed drum was quite adequate to get the crowd together. Public address speakers, mounted on jeeps, patrolled the area telling the people that the test was of no use unless they came back to have it read and to be vaccinated, if necessary.

When the campaign was closed on March 21, 1953, the goal had been passed, and the number actually tested was 751,000. The percentage of return was 67, which is almost the average for a slower campaign. One team of 11 persons had tested 16,500 children in a single day. This means, of course, that the team itself did only *the actual test; the rest of the community* brought the children and took them away.

The number of children expected to be tested under this program in India in April 1953 will be more than a million, and in all the area rather more than one and a half million persons. Our goal for the year is 16 million, and we think we will pass it. We are, however, desperately in need of a few more physicians, for several wholly new programs await only a team leader without whom the program cannot start.

It Can Be Done—Together

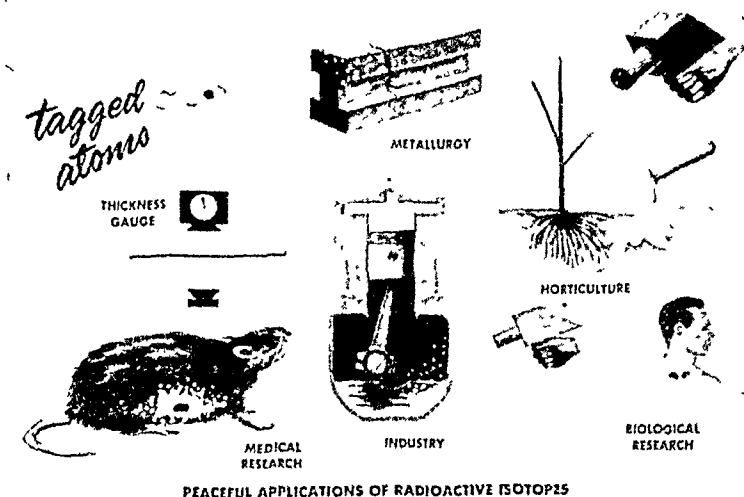
Three years ago we were about ready to say that mass programs among the villages of Asia were not feasible. We know now that, even

with the tiny budgets available, they are quite possible if we face the local conditions realistically. To do a successful job, we must have a strong national leader in charge, a few good international personnel specially trained and with rugged constitutions. Given this, and enough transport and a steady supply of vaccine, the job can be done. It is above all things, however, a team job. The government cannot do it without help from outside. WHO cannot do it without money for equipment and supplies from UNICEF. UNICEF certainly cannot do it without WHO-trained personnel.

In the struggle to get money for our budgets, the separate agencies of the United Nations are tempted to talk only of themselves in order to catch the ears, against all the competing din of other claimants, of the people who vote the money. This may be necessary at times, but it ought not to be the pattern. Professional advice is not enough; supplies alone are not enough; but when competent technical advice and imported supplies are offered together, then things begin to happen. And it is only when things begin to happen in the countries receiving the aid that they begin to understand that the United Nations means business. The endless headlines emphasizing international quarrels do not sell the United Nations to Asia. They are likely to say: "A plague on both your houses!" If we want to impress them, it will be with deeds—not words.



Radiation Exposure in the United States



Reactor-Produced Radioactive Isotopes

By SAMUEL C. INGRAHAM, II, M.D., M. P.H., JAMES G. TERRILL, Jr., C.E., M.B.,
and DADE W. MOELLER, M.S.

RADIOACTIVE ISOTOPES "in the types and quantities producible in a nuclear reactor create health and safety problems which are not necessarily limited to the individual user, but are a matter of public interest as well." This statement was made by the United States Atomic Energy Commission (1), which is responsible for distributing and supervising the use of all reactor-produced radioactive isotopes in this country. It demonstrates the need for continual vigilance relative to these materials.

Although the radiation exposure received by persons using radioactive isotopes appears to be of a relatively low level, it is a fact that their use is becoming more widespread. Today more than 1,100 medical institutions, colleges and

universities, industrial firms, Federal and State laboratories, foundations, institutes, and physicians have used or are using these materials. About 7,500 persons are directly involved in their use, besides the persons who are receiving medical applications of radioactive isotopes.

Reviewed here are data from the literature on the amount of radioactive isotopes in use, regulations concerning shipment and use, and levels of radiation exposure received by persons involved. These data supplement an earlier presentation by the authors on the principal sources of radiation exposure in the United States (2).

Distribution

The Isotopes Division of the United States Atomic Energy Commission distributed only 96 curies of radioactive isotopes in fiscal 1947, the first year distributions were made. Each year since that date, the amount shipped has increased substantially. A total of 4,250 curies had been distributed by June 30, 1952. Of this amount, almost 1,800 curies were radioiodine and radiophosphorus, which decay rapidly.

Dr. Ingraham is assistant chief of the radiological health branch, Division of Engineering Resources, Bureau of State Services, Public Health Service. Mr. Terrill is acting chief of the branch, and Mr. Moeller is on the staff. This report was prepared after consultation with the Isotopes Division of the U. S. Atomic Energy Commission, Oak Ridge, Tenn.

An additional 2,200 curies were radiocobalt, which is distributed as a sealed source. Less than 1 percent of all the radioactive material shipped was in the very hazardous class of radiomaterials, as defined by the National Committee on Radiation Protection.

More than 31,000 shipments of radioactive isotopes were made from the Oak Ridge National Laboratory between August 1946 and November 1952. The number of shipments during this period for each principal isotope is as follows (3):

<i>Radioactive isotope</i>	<i>Number of shipments</i>
Iodine-131-----	12, 058
Phosphorus-32-----	8, 784
Carbon-14-----	1, 381
Sodium-24-----	1, 218
Sulfur-35-----	680
Gold-198, -199-----	963
Calcium-45-----	468
Iron-55, -59-----	415
Cobalt-60-----	634
Potassium-42-----	506
Strontium-89, -90-----	234
Other-----	4, 033
Total-----	31, 374

The following data show the distribution of radioactive isotopes from August 1946 through June 1951 according to use (1):

<i>Field of utilization</i>	<i>Number of shipments</i>
Medical therapy-----	8, 981
Animal physiology-----	4, 328
Physics-----	1, 274
Chemistry-----	1, 040
Plant physiology-----	877
Industrial research-----	784
Bacteriology-----	321
Other-----	1, 300
Total-----	18, 905

Transportation

The Interstate Commerce Commission is empowered to formulate rules and regulations to assure the safe interstate transportation of radioactive materials by commercial motor vehicle, rail, and water carrier. They cooperate in the formulation of regulations with the American Association of Railroads, the United States Coast Guard, and the Civil Aeronautics Board, which act as the enforcement agencies in their respective fields. Regulations governing postal shipment of radioactive materials are both formulated and enforced by the United States Post Office Department and are adminis-

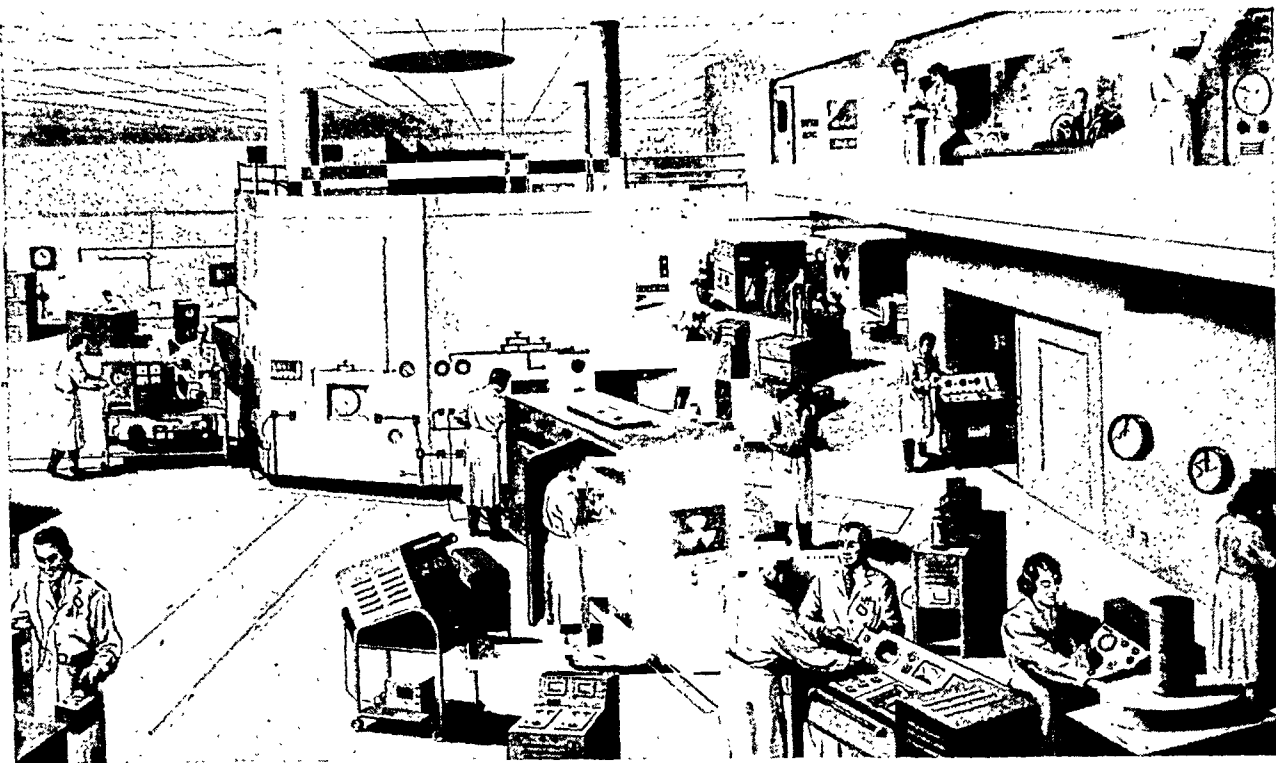
tratively independent of the Interstate Commerce Commission. However, the Post Office must collate their regulations with those of the Commission since several carriers may be involved in any one shipment process. These regulations attempt to protect people and films from exposure to radiation and at the same time to limit the cost and burden of shielding materials (4).

Interstate Commerce Commission regulations limit the quantity of radioactive substance packed in 1 outside container to 2 curies, except by special arrangement. They limit the allowable radiation from the shipping container to 200 milliroentgens per hour at the surface and 10 milliroentgens per hour at a distance of 1 meter. Both of these requirements must be satisfied. Shipments are exempt from these regulations if they contain 0.1 millicurie or less of radioactive material and meet other special requirements that overcome the radiation hazard. The Atomic Energy Commission has reported approximately 95 percent of all shipments have had an external radiation level of less than 0.015 roentgen per hour at the surface of the container.

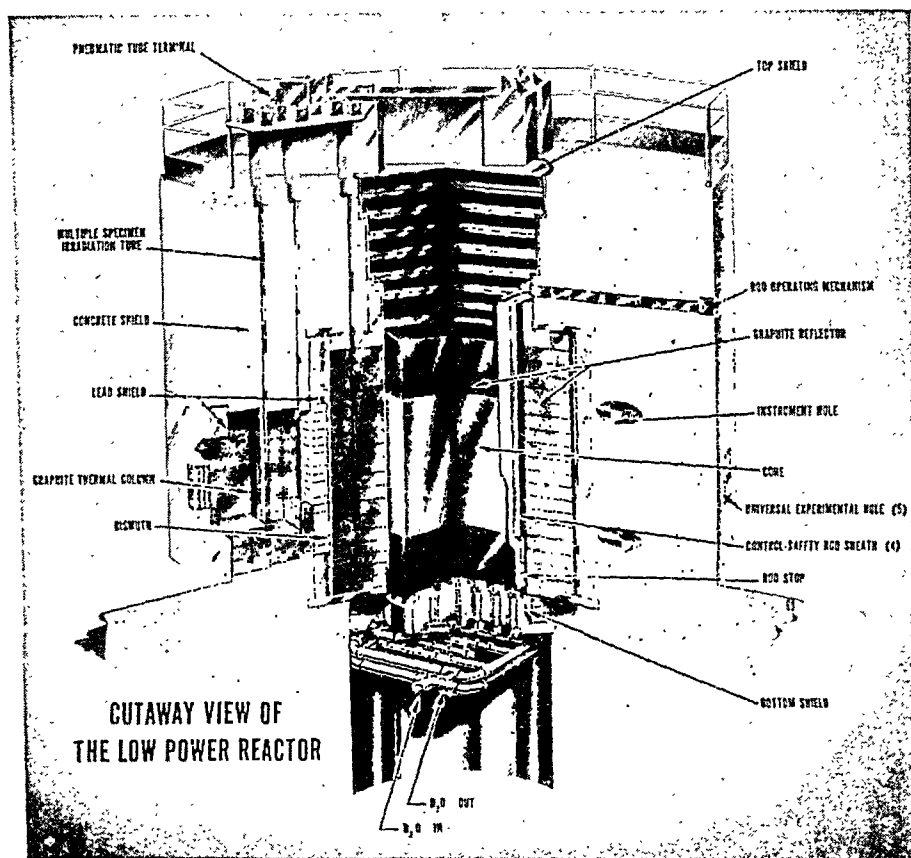
The contractor at the Atomic Energy Commission installation assumes responsibility for packaging isotopes, in accordance with the regulations. Generally, the only concern is transporting the material to the user from the installation. However, the recent trend for the prime receiver of radioactive isotopes, such as a large central hospital, to process and redistribute them to secondary receivers, such as smaller hospitals, creates additional transportation problems.

Control of Utilization

The Atomic Energy Commission, exercising its responsibility under the Atomic Energy Act of 1946 (Public Law 585, 79th Cong. 2d sess.), has to date accomplished control of radioactive isotope distribution and use by an allocation or "licensing" procedure. The radioactive materials distributed by the Commission have been made available only to those who have the necessary prerequisites in training and equipment to handle the materials safely (1). A secondary receiver is, of course, subject to the



Production of Artificial Radioactive Isotopes in a Low Power Atomic Reactor



The top sketch shows the reactor housing, control stations, and other equipment as they would appear in use by industry, universities, and other research institutions. At left is a cutaway drawing of the reactor. This "atomic furnace" can be operated at a rate of 8 hours a day, 5 days a week, for 10 years before being recharged. It was designed for the Atomic Energy Commission. (Illustrations courtesy of North American Aviation, Inc.)

same regulations in the handling and usage of the radioisotopes as is the primary receiver.

The allocation control procedure is complemented by the activities of an advisory field service. Radiological safety specialists visit users and offer advice on the design of radiochemical laboratories, remote handling equipment, and shielding, decontamination procedures, standardization of measurements, and the safe use and disposal of radioactive isotopes. The practices, equipment, and records of the users are reviewed with particular emphasis on factors involved in radiation safety (5).

According to the Atomic Energy Commission, increased use of radioactive isotopes in the future will necessitate supplementation of the present centralized method of control by supervision at the point of use. The responsibility of the Commission for the control of the hazards from "byproduct materials," as described in the Atomic Energy Act of 1946, is being supplemented by a joint Atomic Energy Commission-Public Health Service program of assisting state and local health organizations to assume responsibility for the day-to-day surveillance of Commission-distributed radioactive isotopes.

Exposures to Radiation

In handling and preparing radioactive isotopes, the user and the personnel nearby are potentially exposed to internal and external radiation. When radioactive isotopes are used for medical diagnosis and therapy, the patient too receives exposure. It should be emphasized, however, that the exposure received by the patient in the medical application of radioactive isotopes is a planned exposure and is administered for his net medical benefit.

The most persistent hazard to health associated with the use of these materials is the possibility of internal radiation as the result of radioactive substances being accidentally ingested, inhaled, or absorbed. The enormous potency of very small amounts within the body is emphasized by the recommended standards (6), which are summarized in table 1.

Since the determination of the amount of radioactive material within a person's body is, at present, a complicated procedure, few data

Table 1. Maximum permissible levels for specific radioactive isotopes

Radioactive isotopes	In the body (micro-curie)	In liquid media (micro-curie per ml.)	In air (micro-curie per ml.)
Iodine-131-----	0.3	3×10^{-5}	3×10^{-9}
Phosphorus-32----	10	2×10^{-4}	1×10^{-7}
Carbon-14-----	{ 250 (fat) 1,500 (bone)	3×10^{-3} 4×10^{-3}	1×10^{-4} 5×10^{-7}
Sodium-24-----	15	8×10^{-3}	2×10^{-3}
Cobalt-60-----	3	2×10^{-2}	1×10^{-3}
Strontium-89-----	2	7×10^{-5}	2×10^{-3}
Strontium-90 (+ Yttrium-90)---	1	8×10^{-7}	2×10^{-10}

are available regarding exposures due to internal radiation. Data on external radiation exposures have, however, been reported. One report concerns the weekly exposures, as measured by film badges, of 140 persons working in radioisotopes laboratories. Of 4,750 film badges worn by these persons during an 8-month period, only 1 indicated a weekly exposure greater than 0.3 roentgen, the maximum permissible weekly dose. More than 4,700 badges indicated weekly exposures of less than 0.05 roentgen (?).

Radioactive Isotopes in Industry

Radioactive isotopes are being used in a variety of research problems, in radiography, and in such testing and measuring devices as thickness and liquid level gauges (2). The principal radioisotopes used in industry, some of their properties, and examples of their use are listed in table 2. The figures given in the third column illustrate the enormous potency of small quantities of the radioactive isotopes; they are not necessarily related to the quantities actually used in the examples cited.

Radioactive Isotopes in Medicine

Radioactive isotopes are used both internally and externally for medical diagnosis and therapy. In this report, intracavitary and interstitial uses of sealed sources of radioactive isotopes are considered external since the radioactive material does not leave the container in which it is sealed even though it is within the body. Some of the better known medical ap-

plications of radioactive isotopes are as follows (8):

Sodium-24—Correlation of sodium turnover with congestive heart failure; differentiation of normal and restricted blood flow; radio-cardiography (determining pumping qualities of the heart).

Phosphorus-32—Determination of extent of tumor mass in brain tumor surgery; treatment of polycythemia vera and chronic leukemia.

Iodine-131 in diiodofluorescein—Location of certain brain tumors.

Iodine-131—Detection of hyperthyroidism; location of thyroid cancer offshoots, or metastases; treatment of hyperthyroidism, thyroid cancer, and metastases.

Cobalt-60—Interstitial sources for treating accessible tumors and teletherapy units for deep-seated tumors.

Strontium-90—Beta-ray source for treating surface lesions.

Gold-198 (colloidal)—Treatment of subsurface tumors of lymphoid system and chronic leukemia.

Internal Sources

Iodine-131 is the most widely used radioactive isotope for medical purposes, and phosphorus-32 ranks second. A medium-sized hospital (150 to 300 beds) participating in the isotopes program will have some 35 millicuries of radioactive iodine on hand. A large hospital (400 to 700 beds) may have 200 to 300 millicuries of this material, according to the January 1951 report of the Joint Fire and Ma-

rine Insurance Committee on Radiation of the major private underwriting and insurance associations.

Radioiodine given orally is rapidly absorbed from the gastrointestinal tract and distributed throughout the body. In normal persons, the thyroid gland will fix 10 to 25 percent of the dose and the remainder will be excreted in the urine within 24 hours. In patients with hyperthyroidism, 50 to 80 percent of the dose may be fixed by the thyroid (9).

Radiophosphorus is given either orally or intravenously. About 75 percent of the oral dose is absorbed and the remainder is lost in the feces. Of the amount reaching the circulatory system, whether the dose is administered orally or intravenously, 20 to 40 percent is excreted quickly through the kidneys, and the rest is distributed throughout the body (9).

Thus, in the medical application of radioactive isotopes the whole body is subjected to some radiation, most of which occurs during the first day or so after the dose is given. For example, for each millicurie of radioactive phosphorus administered to a patient, the resultant total-body irradiation is 10 roentgen equivalents physical, taking into account the half life of the isotope and the excretion of part of the dose (9).

Table 3 presents the range of the usual doses of iodine-131 and phosphorus-32 and the theoretical exposure resulting in the critical organ of the body. Calculations were made from published data, as indicated.

Table 2. Radioactive isotopes in industry

Radioactive isotope	Half life	Millicuries of radioactive isotope per gram of total element as available	Example of use
Cobalt-60.....	5.3 years.....	34 to 5,000.....	Radiography.
Selenium-75.....	127 days.....	3.3 to 100.....	
Tantalum-182.....	117 days.....	105 to 1,500.....	
Carbon-14.....	5,720 years.....	250 to 1,500.....	Thickness gauge.
Strontium-90.....	25 years.....	160,000.....	Mark interfaces and measure intermixing in pipelines.
Barium-140.....	12.8 days.....	72,000,000.....	
Antimony-124.....	60 days.....	12 to 1,500.....	
Iron-59.....	46.3 days.....	500 to 1,500.....	Measure engine wear.
Calcium-45.....	152 days.....	0.2 to 19,000,000.....	Evaluate detergents.
Yttrium-90.....	2.54 days.....	115.....	Used as tracer in dyeing process.
Lanthanum-140.....	40 hours.....	525.....	Determine sulfuric acid content in chromium plating solutions.

¹ Approximate.

Table 3. Range of radiation exposures from diagnostic and therapeutic doses of radioactive phosphorus and iodine

Radioactive isotope	Disease	Average total oral dose ¹ (microcuries)		Selected critical organ	Total radiation exposure to selected critical organ ² (roentgens or roentgen equivalents physical)	
		Diagnosis	Therapy		Diagnosis	Therapy
Iodine-131.	Hyperthyroidism.	100 to 300 (usually 100).	3,000 to 10,000.	Thyroid. ³	⁴ 100 to 1,100.	⁴ 11,000 to 40,000.
	Thyroid cancer.	1,000 to 3,000.	⁵ 50,000 to 250,000.		⁴ 4,000 to 11,000.	⁶ 24,000 to 300,000.
Phosphorus-32.	Blood dyscrasias.	100 to 500.	3,000 to 10,000.	Bone. ⁷	2 to 7.	40 to 130.
				Muscle.	1 to 3.	20 to 65.

¹ Source: Medical physics, edited by Otto Glasser. Chicago, the Year Book Publishers, Inc., 1950, vol. II.

² Sources: Marinelli, L. D., Quimby, E. H., and Hine, G. J.: Dosage determination with radioactive isotopes. II. Practical considerations in therapy and protection. *Am. J. Roentgenol.* 59: 260-280 (1948).

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isotopes in biology and medicine. Madison, University of Wisconsin Press, 1948, p. 377-394.

See also footnote 1.

³ Average thyroid weight of 30 grams used in calculations.

⁴ Assumes 75 percent absorption of oral dose in thyroid.

⁵ Usually consists of a series of smaller doses.

⁶ Assumes 10 to 30 percent absorption of oral dose in thyroid.

⁷ Weight of bones in average man assumed to be 7,000 grams.

As can be seen from these data, exceptions to the standards established for permissible levels of radiation are made when radioactive isotopes are used clinically since the intent here is to produce or measure biological changes rather than to avoid them. In certain therapeutic applications of radioactive isotopes, the total-body irradiation may be 75 to 100 roentgens.

Powell (10) reports that patients who have received internal applications of radioactive materials do not ordinarily constitute a significant source of external radiation. However, when a therapeutic dose of a gamma-emitting isotope, such as iodine-131, has been given, the maximum permissible dose level, 0.3 roentgen in air per week or 7.5 milliroentgens per hour for a 40-hour week, may be found as far away as several feet from the patient. It has been recommended as a public health precaution that "patients who receive large doses of iodine-131 or gold-198 should be hospitalized until the total residual activity in the body is not over 30 millicuries" (11).

Periodic radiation surveys of the areas in the hospital where these patients are located may be required, and the wearing of film badges by the nurses caring for them is recommended (12). The external radiation hazard may be minimized through use of the protective measures—distance, time, and shielding.

The patient who has been given one or more doses of a radioactive isotope requires special supervision and handling if nurses and other personnel are not to become contaminated. It is recommended that rubber gloves be worn while bathing the patient (12). In addition, such problems as the contamination of bed linen must be considered. These articles may require special storage or laundering procedures (10).

External Sources

Strontium-90 and cobalt-60 are the principal radioactive isotopes used in medical therapy as external sources of radiation. Beta-ray applicators (strontium-90) are available for the treatment of certain eye conditions. Cobalt-60

is available in the form of large shielded concentrated sources for deep therapy and in the form of small needle sources for intracavitary and interstitial therapy. The Atomic Energy Commission has authorized 12 applicants to use teletherapy units, amounting to a total of some 16,000 curies. Three of these units are already in operation. Twenty-two applicants have been authorized to use small sources, such as needles, totaling some 7,600 millicuries.

Dosages administered to the patient are of the order of 6,000 to 7,000 roentgens. Such therapy, however, is used only for conditions demanding drastic measures, and the exposure is limited to a small section of the patient's body.

Wastes

Wastes from the use of radioactive isotopes by industry, the medical profession, and research laboratories could create health hazards to persons outside the installations using them. However, if the recommendations for the disposal of the wastes from the use of phosphorus-32 and iodine-131 made by the Subcommittee on Waste Disposal and Decontamination, National Committee on Radiation Protection (13), are followed, few, if any, hazards should arise. Ruchhoft and Feitelberg (14) have shown that the dilution needed to reduce the activity of liquid isotopic wastes from hospitals to safe limits is generally available, and, therefore, their disposal is not a major problem. Radioactive isotopes, such as cobalt-60, which are distributed as sealed sources normally have no waste disposal problems.

Conclusion

It would appear that the radiation exposure in the United States due to reactor-produced radioactive isotopes distributed by the Atomic Energy Commission is currently limited to relatively few people and is of a relatively low level. However, there is no indication of a decline in the use of these materials, but rather there is a strong probability that their use will become much more extensive. Further study of radiation exposure from this source as data become available may be required.

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Anthrax in the United States

By JAMES H. STEELE, D.V.M., M.P.H., and RAYMOND J. HELVIG, D.V.M., M.P.H.

ANTHRAX TODAY does not seem to present the serious public health problem of former years. In 1951, only 60 cases were reported to the National Office of Vital Statistics, Public Health Service. Forty-five, or 75 percent, of these cases occurred in the northeastern States and were attributed to occupational exposure. There were less than 15 human cases in other States. The highest incidence occurred in January, February, March, April, May, and November. During the period 1945 to 1951, inclusive, 372 cases of human anthrax occurred, most of them in the 7 northeastern States, where industrial exposure is usually stated to be the source of infection (table 1). In the remaining 41 States, 63 cases were reported, of which 29 (21 farmers and 8 veterinarians) were due to agricultural exposure. Twenty States reported no cases of anthrax in the period 1945-51; 24 reported less than 10 cases; 1, less than 25; 2, less than 100; and 1, more than 100.

The 5 cases reported in Florida were attributed to an outbreak of bovine anthrax in the fall of 1951. The individuals involved were a cowboy who skinned a cow, dead of anthrax, two veterinarians who vaccinated cattle in this area, a laboratory technician who handled a suspected specimen, and a child in a nearby town. In Arkansas 5 of 9 cases were associated with the skinning of a cow that had died suddenly. The farmer was assisted by his family and neighbors in the salvage operation. The 2 cases

reported in Kentucky were in farmers who removed the hides from mules that had died of anthrax. The mule carcasses then were fed to swine, and the swine developed anthrax. In California, one of the cases occurred in a sheepherder who sheared infected sheep. On different occasions, three California veterinarians contracted the disease while performing post mortems on a cow, dead of anthrax. In New Jersey, a farmer who killed and dressed an infected heifer developed the disease. Most of the human cases reported in the western and southern States occurred under similar conditions. All of the cases were of the cutaneous type. There are no records of human anthrax caused by the ingestion of contaminated milk or meat in the United States in recent years.

During 1952 provisional reports indicated that there were 42 human cases of anthrax in the United States. This compares with 60 in 1951. Three of the 1952 cases occurred in Ohio: in a veterinarian, a laboratory technician who handled specimens, and a carpenter who worked in a feed mill where contaminated feed had been handled.

Animal Anthrax

During the period 1945 to 1950, inclusive, 658 outbreaks of animal anthrax were reported from 32 States with estimated losses of 8,504 head of livestock. Occurrences in new areas were reported from 51 counties in 16 States. In 1951, a noticeable increase in outbreaks was observed. There were 483 outbreaks in 25 States involving 113 counties, with a loss of 2,753 animals. Three-fourths as many outbreaks occurred in 1951 as in the 6-year period 1945-50; however, the total number of animal losses was

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Table 1. Reported cases of human anthrax: United States and each State, 1945-51

Area and State	1951	1950	1949	1948	1947	1946	1945	Total
United States.....	60	49	54	60	69	40	40	372
New England:								
Maine.....					1			1
New Hampshire.....						2	7	9
Vermont.....								
Massachusetts.....	5	4	3	3	2	2	4	23
Rhode Island.....								
Connecticut.....	1	1		1		1	1	5
Middle Atlantic:								
New York.....	5	3	26	13	25	10	3	85
New Jersey.....	8	7	2	16	9	4	2	48
Pennsylvania.....	26	25	13	18	18	15	11	126
East North Central:								
Ohio.....			1			1	1	3
Indiana.....								
Illinois.....			1					1
Michigan.....								
Wisconsin.....								
West North Central:								
Minnesota.....								
Iowa.....								
Missouri.....	1							1
North Dakota.....							1	1
South Dakota.....				1				1
Nebraska.....						2		2
Kansas.....			1					1
South Atlantic:								
Delaware.....	1	2		1				4
Maryland.....		1						1
District of Columbia.....								
Virginia.....								
West Virginia.....								
North Carolina.....								
South Carolina.....								
Georgia.....		1					1	2
Florida.....	5							5
East South Central:								
Kentucky.....	1			1				2
Tennessee.....								
Alabama.....								
Mississippi.....								
West South Central:								
Arkansas.....	1	1			7			9
Louisiana.....				2			2	4
Oklahoma.....					1		2	3
Texas.....		1			2	2	2	7
Mountain:								
Montana.....								
Idaho.....						1	2	3
Wyoming.....								
Colorado.....		2						2
New Mexico.....			3	1				4
Arizona.....				1				1
Utah.....								
Nevada.....								
Pacific:								
Washington.....				1	1			2
Oregon.....								
California.....	6	1	4	1	3		1	16

less than in 1946 when there was a severe epizootic in Louisiana which killed over 3,000 animals. Missouri had the highest losses in 1951, with 694 animal deaths, of which 440 were in horses and mules. Fairly large losses were re-

ported in California, Florida, Illinois, Iowa, Kentucky, Nevada, Tennessee, and Texas.

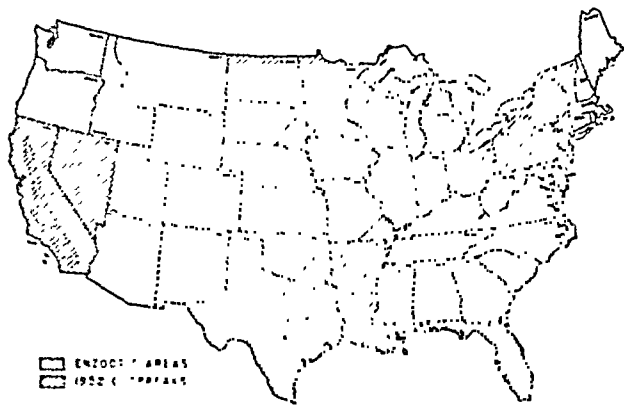
An unusual feature in the 1951 losses was the great number of widely scattered outbreaks in swine. The Bureau of Animal Industry, U. S.

Department of Agriculture, reported 1,088 swine deaths compared to 1,001 deaths in cattle. The greatest swine losses were in Illinois, Iowa, Missouri, and Kentucky. Coincident with the increased number of swine cases was the condemnation of 232 infected carcasses by the Federal Meat Inspection Service. These 232 cases were more than half the total of 367 hogs and 39 cattle condemned because of anthrax during the entire period July 1945 through December 1951 in establishments under the supervision of the inspection service.

In 1951, outbreaks in animals were reported in 15 States, in 51 counties which previously had had no history of the disease: Indiana, Kentucky, Mississippi, New Jersey, and Ohio, 1 each; Florida, Minnesota, and Oklahoma, 2 each; Louisiana, Tennessee, and Wisconsin, 3 each; Missouri, 4; Texas, 6; Illinois, 10; and Iowa, 11. No human cases were attributed to any of the swine outbreaks. Wisconsin also reported 102 cases in mink. These were thought to have been caused by ingestion of infected animal feed.

The Florida outbreak was the first since 1928. The disease involved deer, and beef and dairy cattle. The cause was not determined. Bone-meal was suspected, but laboratory examination did not reveal *Bacillus anthracis*.

Although swine are considered to be more resistant to anthrax than any other livestock species, the disease is not uncommon in these animals in the areas where the infection exists enzootically. Infections in swine have also oc-



Anthrax in cattle, swine, horses, sheep, and mink.

Source: Bureau of Animal Industry, U. S. Department of Agriculture, and Public Health Service.

curred in noninfected areas because of consumption of contaminated feed, but cases usually appear after infection of other livestock. Infection in swine usually results from their feeding on carcasses of animals dead of anthrax, from following infected animals, or from deep rooting in contaminated pastures during warm weather. Anthrax in swine may take many forms including the acute or the chronic forms with characteristic symptoms of septicemia or glossitis with enlargement of the cervical lymph nodes. In addition, mild or latent cases often occur which are not readily diagnosed. The swine outbreaks that occurred in the midwest in 1951 were all on premises hitherto considered free from infection and far removed from enzootic areas. Although the Bureau of Animal Industry, in cooperation with State livestock sanitary authorities, carried on special investigations, they failed to establish a definite source of infection. The history of some cases suggested that contaminated mixed feed may have been the source of infection. Laboratory examination of suspected feed samples failed to reveal *B. anthracis*.

The map illustrates the prevalence of anthrax in cattle, swine, horses, sheep, and mink in 1952. The stippled areas are the known enzootic areas. These areas were not involved in the swine outbreaks. Twenty States did not report any animal anthrax. The largest number of cases was reported in swine in the midwestern States (table 2) during the winter and early spring. This unusual seasonal occurrence is of special significance, inasmuch as anthrax is usually considered a warm weather disease among animals. Ohio had outbreaks in 56 counties involving over 280 farms. Indiana reported cases in 46 counties on 106 farms. Illinois reported 50 counties and 117 farms with anthrax cases. Michigan had 17 counties and 31 farms with infection. Wisconsin reported anthrax in 17 counties on 35 farms. All of these States reported the isolation of *B. anthracis* from bone-meal and attributed most of their outbreaks to contaminated bonemeal. It is important to observe that none of these States is considered to be an anthrax enzootic area. Previous to the outbreaks of late 1951 and early 1952, anthrax had not been reported in Indiana and Ohio for more than 20 years. Illinois and Wisconsin

Table 2. Anthrax outbreaks, 1951-52

State	Date of reported outbreak	Counties involved	Farms involved	Cases in—					Bone-meal isolation
				Humans	Sheep	Cattle ¹	Swine ¹	Miscellaneous	
	1951								
Illinois.....	August.....	50	117	1	2	25	672	1 dog	Yes.
Florida.....	October.....	1	17	5		200			No.
Oklahoma.....	November.....	11		1		63	9	2 horses	No.
	1952								
New Jersey.....	January.....	5	20	2		22	12		No.
New York.....	January.....	6	16	1				mink ²	No.
Texas.....	January.....	62	160		10	400	10		No.
Kansas.....	February.....	4	100		50	85			No.
Ohio.....	February.....	56	280	2		10	500		Yes.
California.....	March.....	2	2						
Indiana.....	March.....	46	106			4	100		Yes.
Iowa.....	March.....	17	28						
Michigan.....	March.....	17	31		4	19	15		Yes.
South Dakota.....	March.....	1	1						
Missouri.....	April.....	3	4			10			Yes.
Wisconsin.....	April.....	17	35		2	22	3	mink ²	Yes.
New Mexico.....	May.....	1	1						No.
Georgia.....	June.....	2	4			2	4		No.
New Jersey.....	June.....	7	13	1		28		mink ²	No.
Total.....		308	935	13	68	890	1, 325	3	

¹ Estimated.² Number of cases unknown.

had not had any cases for years, and Michigan had not had a case since 1916. Dr. H. J. Staffseth, Michigan State College, states in a personal communication that the 1916 case is the only known diagnosed case up to 1952. The outbreaks in Ohio, Indiana, and Illinois mainly involved swine, while those in Wisconsin and Michigan were mainly on dairy farms. Wisconsin also had additional cases in mink, as did New Jersey and New York.

Kansas reported bovine anthrax in February. In April, anthrax was reported in beef and dairy cattle on more than 100 farms. An investigation revealed that anthrax had occurred only in herds that had been vaccinated with bacterin. The incubation period was from 3 to 120 days.

In 1952, Georgia reported the first outbreak of anthrax in animals since prior to 1945. Bonemeal was suspected as the vehicle of infection but this was not proved.

Florida had a reoccurrence of anthrax in the summer of 1952 in the area where the 1951 outbreak was reported, and the 1952 outbreak

spread to noninfected areas. Anthrax following vaccination with a bacterin was also reported. Of 300 beef cattle vaccinated by a rancher, 15 developed symptoms of anthrax 4 to 8 weeks following inoculation; 7 died, 2 of them after the surviving affected animals were treated with 3 million units of penicillin daily. None of the 15 animals exhibited typical symptoms and at first the cattle were thought to have been bitten by a snake. An extensive swelling was noted around the site of inoculation behind the shoulder, which in some cases extended forward to the brisket and back to the udder. The course of disease extended over a number of days.

The Ohio swine outbreaks which began in February 1952 were studied by the Ohio Division of Animal Industry and the Ohio Department of Health. These investigations were the first to reveal that imported raw bonemeal was contaminated with *B. anthracis*. Illinois, Michigan, Indiana, Wisconsin, and Missouri reported isolation of anthrax spores from bonemeal samples. The bonemeal was traced to a

New York importer who had bought it in Belgium. Further investigation revealed that the bonemeal had been collected in Asia and southern Europe and brought to Belgium for reshipment to the United States and subsequent distribution in the midwest.

It is interesting to observe that nearly all the hogs involved were pregnant or nursing sows. This is readily explained by the fact that they were the only animals receiving a high protein-calcium ration which is recommended for the pregnant or nursing animal. Few or no cases were observed among other animals, except where some of the sow supplement ration was fed to other animals by mistake, or where through their own efforts, the animals were able to reach it.

The U. S. Department of Agriculture has adopted regulations prohibiting the importation of raw bonemeal. All bonemeal entering this country must now be sterilized at a temperature of 250° F. under 20 pounds of pressure. In addition, many States have adopted similar regulations.

One of the important observations made in the Ohio outbreak was that penicillin or other antibiotics are to be preferred to immunizing agents in the control of anthrax in swine. The administration of 6 million units of penicillin in oil proved very effective in the large sows which weighed from 200 to 400 pounds or more. Penicillin has been used successfully in the treatment of cattle also but is not recommended as a control measure in place of vaccination. In



A cow dead of anthrax. Note the great number of flies on the carcass. Virulent anthrax germs were found in flies taken from this and a partly incinerated carcass on the same ranch.

some bovine cases there have been relapses following the injection of penicillin. Aureomycin and terramycin were used with success.

Public Health

Even though anthrax is not readily transmitted to man, the numerous outbreaks of the disease in animals during the past 2 years have raised a number of public health questions. These questions include: What measures should be taken in handling milk from infected premises? How should meat animals from known infected farms be processed? What steps can be taken to prevent occupational disease among animal handlers? What procedures are recommended for animal disease control so as to remove any threat to public health?

Milk

The question of what to do with milk from a farm where anthrax has occurred in a milking herd or in other animals cannot be answered in all cases by a decision to quarantine the premises, but requires an examination of the problem at hand. As previously stated, there are no reports in the United States of the transmission of anthrax in milk to man. The results of unduly stringent quarantine regulations may tend to discourage reporting of anthrax, and such procedures may also present a serious economic problem to the dairyman. Some sizable nuisance problems have been known to develop when the milk from 500 or 600 cows was dumped on a farm in a warm climate.

The following recommendations have been formulated by the Public Health Service, with the assistance of the Bureau of Animal Industry of the U. S. Department of Agriculture, the Federal Food and Drug Administration, the Federal Civil Defense Administration, U. S. Livestock Sanitary Association, and the American Veterinary Medical Association.

The recommendations, which appear on pages 621 and 622, were transmitted February 4, 1953, by the Public Health Service to State and Territorial milk control authorities and others concerned. In forwarding these recommendations, Dr. Otis L. Anderson, chief of the Bureau of State Services, said:

"In the preparation of this material we have

One method of disposing of an anthrax-infected carcass by incineration



1. Saturate carcass with kerosene, crank case oil, or any other inflammable oil.
2. Cover carcass with a hayrack-full of straw.
3. Place two loads of heavy manure on top of the straw. Set afire. Add manure daily, or when necessary, to keep carcass covered until it is burned to a white ash.

attempted to be objective, realizing that: (a) there are no supported records in the literature of anthrax being transmitted to man through the consumption of milk; (b) unduly stringent quarantining measures may tend to discourage

reporting of anthrax thus nullifying control procedures; and (c) quarantining of dairy farms and exclusion of the entire milk supply from the market when a case occurs, may present a serious economic problem for the dairyman."

Anthrax Control Recommendations

1. All cases of anthrax, or suspected anthrax, should be reported by the dairyman to the local veterinarian and the health officer immediately, and such animals should be isolated completely from the herd and no milk from them sold until declared by a licensed veterinarian to be free from anthrax.

2. Where anthrax has occurred in the dairy herd and the animal or animals affected were stabled in the dairy barn:

a. All feed, hay, straw, manure and dirt likely to have been contaminated, the carcass of each animal dead from anthrax, and milk suspected of containing anthrax organisms or spores, should be disposed of promptly by complete burning or by deep (at least 6 feet) burial, under the direction or supervision of the State health department and/or the State livestock sanitary officials; the dust should be removed from the walls and ceilings; and the entire barn, including walls, ceilings, windows, floors, feed troughs, brooms, shovels, forks, spreaders, etc., should be thoroughly cleaned by washing with a 5-percent lye solution which should be left in contact with surfaces for at least 8 hours.

b. The temperatures of the remaining animals in the milking herd should be taken, immediately

prior to each milking, by a veterinarian or some other official person designated by the health officer to take such temperatures, for a period of 10 days following the removal or recovery of the last case of anthrax. The records of such temperatures should be available at all times for examination by the health officer, livestock sanitary officials, and others concerned. All animals having a temperature of 103° F. (cattle in hot, humid climates often have body temperatures of 103° F. without having any infection; in this case a recheck of the temperature in the late evening or early morning, would be indicated) or showing any other evidence of disease should be isolated from the milking herd immediately, and no milk from such animal should be mixed with the market milk supply until such suspects are declared by a licensed veterinarian to show no further evidence of disease.

c. The milk utensils which have been exposed to any secretion or excretion from the anthrax infected animal should be submerged in boiling water for a period of at least 30 minutes as soon as possible after contamination. This should be done under the supervision of the State or local health department, or the State livestock sanitary officials.

3. Where anthrax has occurred in any animal which has been in the same pasture or lot with the dairy cattle:

a. The entire herd should be removed from such lot, pasture, or portion of pasture, which is likely to have been contaminated by the infected animal, for such time as the State livestock sanitary authority deems necessary.

b. The temperatures of all of the cattle in the milking herd should be taken, immediately prior to each milking, by a veterinarian, or some other official person designated by the health officer to take such temperatures, for a period of 10 days following the removal or recovery of the last case of anthrax. The records of such temperatures should be available at all times for examination by the health officer and others concerned. All animals having a temperature of over 103° F. or showing any other evidence of disease, should be isolated from the milking herd immediately, and no milk from such animal mixed with the market milk supply until such suspects are declared by a licensed veterinarian to show no further evidence of disease.

4. Where anthrax has occurred in any animal on the dairy farm, but has been completely separated from the dairy herd; or where anthrax has occurred on adjoining farms:

a. The dairy herd should be kept under close observation for a period of at least 10 days and any evidence of anthrax reported immediately to the health officer and the local veterinarian.

5. Where dairy cattle are vaccinated for anthrax:

a. Such preventive vaccination should be done in a manner and with a product which is approved by the State livestock sanitary authority.

b. The temperatures of all animals vaccinated against anthrax should be taken, immediately prior to each milking, by a veterinarian or some other official person designated by the health officer to take such temperatures, for a period of 10 days following vaccination or presence of anthrax infection on the premises. The records of such temperatures should be available at all times for

examination by the health officer and others concerned. All animals having a temperature of over 103° F. or showing any other evidence of disease, should be isolated from the milking herd immediately, and no milk from such animal mixed with the market milk supply until such suspects are declared by a licensed veterinarian to show no further evidence of disease.

6. Where certain feeds are suspected by the State officials as being contaminated with anthrax organisms, such feed should be embargoed, or otherwise isolated from further use and distribution pending resolution of the doubts concerning the safety of the product. If found to be contaminated with anthrax organisms it either should be rendered free from contamination by a method acceptable to the State livestock sanitary authority, or it should be destroyed in accordance with 2a above. These determinations should be made as quickly as possible to reduce to a minimum, the physical and economic problems involved in embargoes.

It is realized that the livestock sanitary authorities in some States issue a quarantine that bars the movement of all animal products from the premises on which infection with anthrax has occurred, as a precautionary measure against the mechanical transmission of the disease from one premise to another. Therefore, it is imperative that the milk control authorities cooperate with the livestock sanitary authorities of the State concerned.

It is also important that local and State milk control officials, and the State and local livestock disease control officials, maintain close liaison with each other with regard to reporting of anthrax cases and anthrax control measures. This is necessary to provide for the maximum protection of the health of the persons who may have come in contact with infected animals on the farm, as well as for the protection of the milk consumer, and for the economic welfare of the dairy farmer. Persons handling anthrax infected animals, or materials, should be protected by rubber gloves and boots, which can subsequently be decontaminated with chemical disinfectants.

Other Control Measures

Processing meat animals from infected or quarantined farms should be done in abattoirs or packing plants that are under the supervision of the Federal Meat Inspection Service or a

local meat inspection service where a trained veterinary inspector is on duty. Although the transmission to man of anthrax in meat has never been reported in the United States, the foreign literature has carried numerous reports.

These reports have usually involved raw or semiraw meat products such as hard sausage.

Prevention of occupational anthrax among animal handlers can best be accomplished by health education. The farmer or animal handler must be cautioned against the treatment of sick animals and against attempts to salvage the hide of dead animals. The fact that no human cases occurred among farmers in Ohio can be explained by the farmer's practice of not making any effort to salvage a hog but of burying or burning it. He will skin a cow or horse and feed the carcass to the hogs. However, with the increasing availability of rendering plant pickups of dead animals, this latter practice is disappearing.

On a farm where anthrax is known to be present, the operator should receive instructions either from the attending veterinarian or the health department about how to protect his health. The most important thing to stress is personal hygiene and prompt medical care for any scratches, abrasions, or pimples that may appear.

Animal disease control is primarily the responsibility of the attending veterinarian and the livestock sanitary officials. The success of

antibiotics in the treatment of animal anthrax has provided an excellent weapon to deal with this problem. The live spore vaccines have been used extensively in this country with good results, although sometimes they fail. They should be used only on premises where infection has been proved or where there is strong evidence of disease. The antibiotics may replace the antiserum and bacterins that previously have been used in herds or droves adjacent to infected premises.

Conclusions

Anthrax is not readily transmitted to man. In the United States there is no report of its transmission to man by meat or milk. During 1951-52 animal anthrax cases increased, especially among swine. Some of these outbreaks were traced to contaminated bonemeal. However, even though there were more animal cases, the human cases continued to decline, and in 1952 numbered less than in 1951. Public health aspects are discussed as they relate to milk, meat, occupational disease, and animal disease control.

Anthrax Epidemic Curbed In Paraguay

Anthrax was temporarily halted in the countryside surrounding Coronel Oviedo, a town in Paraguay, after a 2-week fight this spring to prevent the spread of the virulent disease to 113,000 beef cattle. More than 1,300 cattle were given anti-anthrax vaccine. A quarantine area for the infected animals was established.

Barricades were erected on roads leading to Coronel Oviedo, and livestock growers taking their cattle to town either submitted them for vaccination or were required to return the animals to their properties. Even cart-drawing oxen were submitted to vaccination. Any slaughtered animals taken to the town for the market were examined by veterinarians for signs of disease.

Eighty head of cattle had died, but no human cases of anthrax had been found, as of April 17, 1953. Anthrax is greatly feared in Paraguay since livestock production is the backbone of the economy and beef cattle total almost 4 animals to each of the country's 1,500,000 population, according to the news report released in April by the Institute of Inter-American Affairs.

The discovery of the sudden death of 40 cattle in Coronel Oviedo on March 14, 1953, brought immediate assistance to the area from the Technical Cooperation Administration offices located 87 miles away in Asuncion. Laboratory analysis of the ear of a dead animal confirmed the outbreak of anthrax, the first for the area in recent years.

The Interest of Public Health in Diabetes

By MALCOLM J. FORD, M.D., M.P.H.

IN DEALING WITH diabetes mellitus, we are dealing with a disease "so widespread as to make public action . . . the only hope for a successful attack" (1). According to the best estimates, some 2,230,000 persons in the United States have diabetes, and only slightly more than half of these people know that they have the disease. Since diabetes occurs more often among older persons, prevalence of the disease, which today is approximately 15 per 1,000 population, can be expected to increase progressively as our older population continues to grow in number.

Mortality data provide two notable facts about diabetes: First, estimates for the year 1951 reveal that diabetes accounted for approximately 25,000 deaths in the United States—only about 5,000 fewer than the number of deaths estimated for tuberculosis (2). Second, diabetes has moved from twenty-first place among causes of death in 1900 to tenth place in 1950 (taking into account changes in classification of cause of death since 1900 and omitting all ill-defined causes).

With the threat of communicable diseases substantially diminished, the growing problem of chronic diseases stands out as the principal challenge and a most urgent responsibility for

the public health worker. The record of progress against the chronic diseases in the future will be more and more critical in determining the standard of health which we as a Nation shall achieve.

Public health is especially concerned with the prevention of disease—prevention either in the primary sense of preventing the occurrence of the disease, or in the secondary sense of preventing progression of the disease from an early stage to a more severe one.

As is true of many of the chronic diseases, primary prevention of diabetes is as yet an unfulfilled objective. It is now confined to measures suggested by the epidemiology of the disease. The incidence of diabetes is higher among overweight people than among those whose weight is normal or below normal; therefore, discouragement of overweight is in a sense a measure to prevent diabetes. Diabetes appears to run in families; therefore, the advisability of marriage between persons from diabetic families is a question to be considered in terms of preventing the disease. But without more basic knowledge of the cause of diabetes, we cannot depend upon preventing its occurrence.

Secondary prevention of diabetes—preventing the complications which account for a large proportion of the disability and death due to the disease—can, however, be undertaken with definite hope of success. Our broadening knowledge of the nature of diabetes makes feasible an intensive program in which the public health and medical professions can participate. High diabetes morbidity and mortality emphasize the necessity for action.

Case-finding procedures in diabetes are relatively simple and fast, and a variety of tests is

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available for this purpose. Of all the chronic diseases, diabetes is one of the easiest to diagnose, and, thanks to insulin and diet, one of the easiest to control in the individual patient, provided the patient understands the relatively simple treatment measures and cooperates fully with his physician.

Diabetes, a condition in which the body's ability to use and store carbohydrates is impaired, is most likely to be found in persons over 40 years of age, in the obese, or in those who have a history of diabetes in the family. Because mild diabetes does not necessarily produce symptoms recognizable to the patient, it may be present for some time before it is discovered. Usually diabetes becomes serious when the diabetic patient does not know of his condition or when, once knowing, he allows his condition to get out of control. Through case-finding programs the diabetic person can be sent to his physician for care while his disease is in an early stage. Under continued medical supervision, he can learn how to remain a contributing member of society.

During the past few years, a definite pattern for diabetes control has been evolving, and activity areas have been staked out: case finding and referral for care, patient and professional education, and education of the general public designed to disseminate the facts and to encourage a positive attitude regarding diabetes.

Community Detection Programs

The progression of unrecognized and uncontrolled diabetes results all too often in serious complications. The insidious development of the disease calls for aggressive case-finding efforts. For this, community action is needed.

A number of diabetes case-finding programs have been conducted during recent years. Many communities have undertaken urine-testing programs during a special "diabetes week," with varying intensity of campaigns and degree of coverage. In Connecticut, a diabetes detection program has been undertaken each fall since 1948 (3). The program is sponsored by the Connecticut Diabetes Association and the State department of health on a statewide basis. From 1948 through 1951, 55,990 urine

tests were performed, of which 1,503 (or 2.7 percent) were found positive. These persons were referred to their physicians.

In Florida, a continuing statewide program of case finding is now in progress under sponsorship of the State board of health (4). In 1951, a mobile unit did blood sugar tests on 31,334 persons, of whom 411 with possible diabetes were referred to their physicians. Miami, Jacksonville, and Tallahassee have already been screened, and the program is now concentrating in rural areas. A followup study is also in progress. In addition to its diabetes-screening program, Florida has been maintaining a program of insulin distribution to indigent diabetic patients. In 1951, insulin worth more than \$32,000 was given free to 2,555 such patients.

In Georgia, a program of blood-testing for anemia and for abnormalities of carbohydrate metabolism was added in 1949 to the existing health test program for venereal disease and tuberculosis (5). During the past 2 years, over 300,000 persons have been screened for diabetes.

The first blood-sugar screening program in Georgia was conducted in Atlanta in 1950. Statistics for this survey show that 3.3 percent of the population examined had blood-sugar levels above normal. Confirmatory tests were not made on these people; they were referred to their private physicians for final diagnosis. One group of 6 Georgia counties tested in 1951 included 43,543 persons, of whom 55 were previously known diabetic persons, 449 were classified as suspects, and 169 had borderline blood-sugar determinations. These persons, too, were referred to their physicians.

In 1951, diabetes detection was combined with a communitywide chest X-ray survey in Contra Costa County, Calif. (6). Sponsorship of this combined screening program included State and local official and voluntary health agencies and the Public Health Service. A total of 14,681 persons who stated that they did not have diabetes were given the Wilkerson-Heftmann blood-sugar screening test. Results of this primary screening revealed 191 persons with positive tests, a rate of 1.3 percent. A more specific, second blood-sugar screening test reduced the number actually referred to private physicians

to 127. Final diagnostic reports which were received for 102 of these 127 referrals revealed 58 new cases of diabetes, 0.40 percent of the 14,681 participants. In the year following initial screening, glucose tolerance tests were performed on 32 diabetes suspects whose referrals immediately following the survey had resulted in diagnoses of either "not diabetic" or "unknown." Fifteen of them were found to have diabetic glucose tolerance curves, increasing the number of newly discovered diabetic patients to 73. This represents a discovery rate of 0.50 percent among the 14,681 participants in the survey.

These few examples of community detection programs serve to indicate the results to be achieved by such programs. In each instance, many unknowing victims of diabetes were discovered and advised to place themselves under medical care. They have thus been given the opportunity to attain their optimum health.

Education of the Public

As is true with all case-finding programs, the discovery of new cases of diabetes is not the *only benefit which accrues from a diabetes detection program*. This activity also provides both the occasion and the opportunity for educating the general public.

The diabetes case-finding survey affords an effective vehicle for the transmission of detailed information about the disease. It can emphasize the need for periodic health examinations as a means of preventing or forestalling many of the difficulties of long-term diabetes. Equally important, it provides the opportunity to impart to the public an understanding of the problems faced by diabetic patients in the management of their disease. Public education on diabetes can prevent the oft-repeated and tragic mistake of arresting on alcoholism charges a diabetic patient in coma or insulin shock.

The case-finding survey can serve as the basis for public support of a public health program for diabetes control. Many medical leaders believe that the concentration of attention on the problem of diabetes in the community leads to improvement in the diagnosis and treatment of the disease.

Patient Education

In no disease or pathological condition is the education of the patient a more important part of treatment than in diabetes. The patient with newly discovered diabetes faces a period of great adjustment to a new and, at first, psychologically difficult way of life. Here the public health profession can perform a great service by sharing with the physician the task of educating the patient.

Supervision by the physician is essential, but the patient himself has a major responsibility for the control of his disease. Injection of insulin, the following of a diet, a program of exercise, care of the feet, and testing of the urine are all indispensable to successful control of diabetes. Every patient, at least subconsciously, wants to do his job well, but in order for him to do so he must be given special instruction. Public health, with its long experience in health education, can help the physician by giving the diabetic patient the detailed instruction he needs to adjust to and live normally with his disease.

Leading diabetes specialists and clinics treating large numbers of diabetic patients make arrangements for special instruction through individual consultation or formal classes. Diabetes specialists also have written many manuals for the patient's instruction. This type of education, however, does not usually reach the large number of diabetic patients under the care of general practitioners. Here is a distinct opportunity for public health agencies. The wholehearted interest and enthusiasm that can be expected in such classes has been demonstrated in Jacksonville, Fla., Rochester, N. Y., and Boston, Mass.

A number of teaching aids are available for use in group or individual instruction—for example, the widely used kit, "Taking Care of Diabetes," prepared by the American Diabetes Association, the American Dietetic Association, and the Public Health Service. The kit consists of 11 film strips with sound, covering most of the problems the diabetic person faces. There are 12 wall charts, an instructor's guide, a sample set of booklets for the patient, a sample set of meal planning booklets, and a diabetes

guidebook for the physician. The kit is available for preview purposes from the Public Health Service medical directors in regional offices of the Department of Health, Education, and Welfare.

Another excellent teaching aid is the booklet, "Meal Planning With Exchange Lists," prepared by the American Diabetes Association, the American Dietetic Association, and the Public Health Service. This booklet, a recent contribution to the field, standardizes and simplifies the patient's diet. Used under the guidance of a physician, the booklet and lists allow the patient's diet to be adapted from the family menu. It is therefore easier for the patient to accept and follow the prescribed diet.

Establishing Community Programs

As has been learned from experience in the control of a disease such as tuberculosis, a detection and health education program is greatly strengthened by the cooperation of community organizations and institutions. In setting up a diabetes detection and control program, therefore, it is wise to enlist the cooperation and guidance of the local diabetes association. Encouragement of the formation of local affiliate chapters of the American Diabetes Association where none exist will pay big dividends in the successful operation of the diabetes control program.

Any control program poses problems which each community must solve for itself. In diabetes detection and control, the community must decide, for instance, whether its needs and resources indicate diabetes detection alone, or whether to add diabetes detection to a battery of tests. A community must decide, too, whether its diabetes screening program should involve the entire population or only especially vulnerable groups—persons over 40 years of age, those who are overweight, and relatives of diabetic patients. These are decisions which are best made through joint planning with the

local medical society and, if one exists, the local diabetes association.

Once a community decides on detection as part of its diabetes program, a screening technique must be selected. Examination of both blood and urine for sugar is the most reliable method of detection, but this technique is not always practical when a large-scale program is under way. For mass-testing purposes, blood-sugar analysis appears to be the most productive technique, since many suspects can be missed when urinalysis alone is used. For a relatively small expenditure of funds, special equipment for mass-testing, utilizing the blood-sugar technique, can be put into operation, and a full-scale detection program begun. Technical personnel for such an operation can be trained with relative ease, and needed supplies and materials are readily available and relatively inexpensive.

In the control of diabetes mellitus, the public health agency is both a catalyst and an auxiliary force: a catalyst which speeds up the discovery of all cases of diabetes through community action; an auxiliary force which assists the practicing physician in giving the diabetes patient the detailed information which he needs to control and live with his disease successfully.

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Tuberculosis Mortality by State, 1950

FINAL 1950 tuberculosis mortality statistics (by residence) are now available from the National Office of Vital Statistics, Public Health Service, for each State and the District of Columbia. The tuberculosis death rates (all forms) ranged from a low of 6.2 per 100,000 population for Wyoming to a high of 59.6 per 100,000 for Arizona. Four States—Wyoming, Utah, Iowa and Nebraska—had less than 10 deaths per 100,000 population while 6 States—Arkansas, Tennessee, Maryland, Kentucky, New Mexico, and Arizona, and the District of Columbia—had death rates greater than 30 per 100,000.

The overall geographic pattern of tuberculosis mortality for 1950 resembled that for 1949. As shown on the map, the States having highest mortality were confined largely to the south, southwest, and east while the States with the lowest rates were generally those in the northwestern and north central parts of the country.

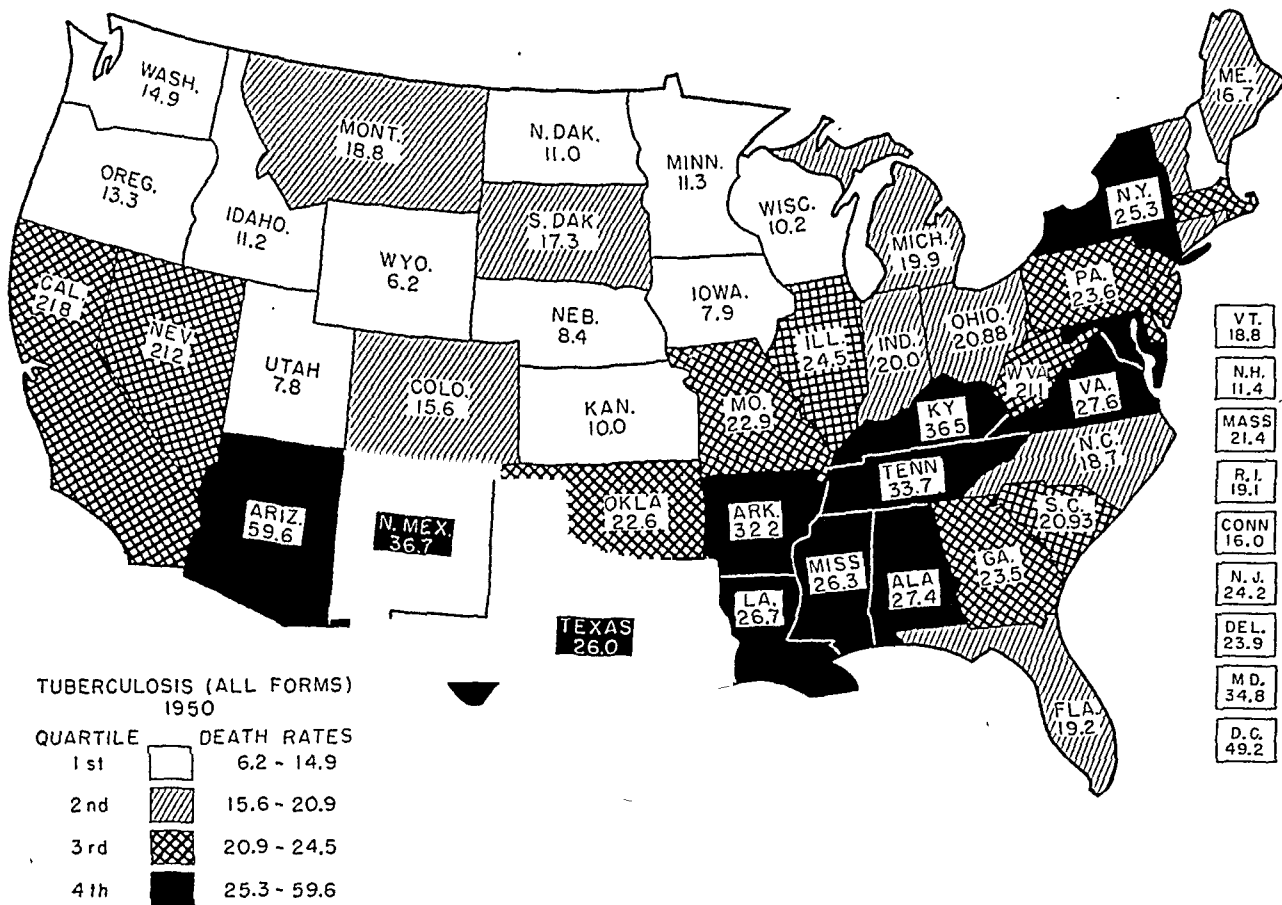
The year 1950 completes a decade of striking reductions in our tuberculosis death rate. For the continental United States, the death rate dropped from an average of 45.8 per 100,000 population for the 3-year period 1939-41 to 22.5 in 1950, a decline of 50.9 percent, whereas in the preceding decade the tuberculosis death rate declined 35.6 percent. All States and the Dis-

Tuberculosis deaths (all forms) and death rates: United States and each State, 1950

(States ranked by death rate)

Rank	State	Number of tuberculosis deaths	Rate per 100,000 population ¹	Rank	State	Number of tuberculosis deaths	Rate per 100,000 population ¹
	United States.....	33, 959	22. 5	25	South Carolina.....	443	20. 9
1	Wyoming.....	18	6. 2	26	West Virginia.....	424	21. 1
2	Utah.....	54	7. 8	27	Nevada.....	34	21. 2
3	Iowa.....	207	7. 9	28	Massachusetts.....	1, 005	21. 4
4	Nebraska.....	111	8. 4	29	California.....	2, 312	21. 8
5	Kansas.....	190	10. 0	30	Oklahoma.....	505	22. 6
6	Wisconsin.....	350	10. 2	31	Missouri.....	907	22. 9
7	North Dakota.....	68	11. 0	32	Georgia.....	808	23. 5
8	Idaho.....	66	11. 2	33	Pennsylvania.....	2, 474	23. 6
9	Minnesota.....	336	11. 3	34	Delaware.....	76	23. 9
10	New Hampshire.....	61	11. 4	35	New Jersey.....	1, 171	24. 2
11	Oregon.....	202	13. 3	36	Illinois.....	2, 135	24. 5
12	Washington.....	355	14. 9	37	New York.....	3, 759	25. 3
13	Colorado.....	207	15. 6	38	Texas.....	2, 006	26. 0
14	Connecticut.....	322	16. 0	39	Mississippi.....	573	26. 3
15	Maine.....	153	16. 7	40	Louisiana.....	717	26. 7
16	South Dakota.....	113	17. 3	41	Alabama.....	838	27. 4
17	North Carolina.....	758	18. 7	42	Virginia.....	917	27. 6
18	Montana.....	111	18. 8	43	Arkansas.....	615	32. 2
19	Vermont.....	71	18. 8	44	Tennessee.....	1, 110	33. 7
20	Rhode Island.....	151	19. 1	45	Maryland.....	815	34. 8
21	Florida.....	531	19. 2	46	Kentucky.....	1, 075	36. 5
22	Michigan.....	1, 268	19. 9	47	New Mexico.....	250	36. 7
23	Indiana.....	786	20. 0	48	District of Columbia.....	395	49. 2
24	Ohio.....	1, 659	20. 9	49	Arizona.....	447	59. 6

¹ Enumerated population Apr. 1, 1950.



trict of Columbia shared in the general decline, with 7 States—California, Colorado, Florida, Nevada, Washington, Wisconsin, and Wyoming—having declines of 60 percent or better. In Arkansas and the District of Columbia the tuberculosis death rate dropped less than 40 percent.

Although these declines are impressive, the numbers of deaths remain high for a disease whose cause and manner of prevention have been well known for over a half a century.

Furthermore, the decline in the annual num-

ber of new cases of tuberculosis reported during recent years has been slight compared with the decline in mortality. That the number of newly reported cases remains high, despite the rapid decline in death rates, underscores the fact that efforts to wipe out tuberculosis must continue to have high priority among public health problems.

This report was prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.



Public Health Service Emergency Assistance In Disaster Relief

By GORDON E. MCCALLUM, C.E., and
HARVEY F. LUDWIG, M.S.

The principal public health problems created by natural disasters are due to the breakdown of public health safeguards resulting from damage to, and failure of, certain public works and other facilities and the interruption of public services upon which present-day urban communities have become almost totally dependent. Among examples which can be cited are facilities for maintaining a safe and adequate supply of water; facilities for collecting, treating, and disposing of sewage, garbage, and other community wastes; measures for controlling and protecting against rodents and insects which transmit disease; and procedures for maintaining food and milk free from contamination. Failure of such facilities or services reverts the community to virtually primitive conditions, or worse, because the individual has largely lost his knowledge of how to obtain and purify his own water supply, how to prepare food without fuel, how to dispose of his own wastes, or how to improvise temporary shelter. Unless emergency protective measures are promptly taken, there is great hazard of large-scale epidemics of communicable diseases. The seriousness of such situations is one of the basic reasons for the unique and powerful authority of the health officer in an American State or community.

The role of the Public Health Service at times of disaster is the provision of emergency assistance to stricken areas whenever their resources become taxed to the degree that a request for

outside assistance becomes necessary. The assistance is provided through the State departments of health, as is other assistance by the Service. The Public Health Service has a long record of successfully providing such assistance: the yellow fever epidemic in Hampton, Va., in 1894 and in New Orleans in 1905; the plague outbreaks in San Francisco in 1907 and in New Orleans in 1914 and in 1920; the Mississippi River flood of 1927; the Ohio River flood of 1937; the gulf coast hurricane in 1947; the Texas City disaster of 1947; and the California encephalitis epidemic of 1952. In every instance Public Health Service assistance has simply supplemented, as required, the regular State-community public health operation, in which the community, State, and Federal health officials function as a team on all sorts of problems. Voluntary health agencies have also aided in emergency activities, with the result that over the years a close collaboration has evolved between the Public Health Service and the American National Red Cross on the handling of emergency health problems.

Policies Governing Emergency Activities

In carrying out its emergency assistance activities, the Public Health Service makes available to the States its regular resources of professional personnel, hospitals, equipment, and supplies. Under extreme conditions it can arrange additional assistance through utilization of the Reserve Corps, by which needed specialists from outside the Government can be quickly mobilized and deployed to the sites of need.

The Public Health Service also has traditionally utilized its offices to help mobilize resources from outside the regular health agencies. Through the continuing contacts of its personnel with their professional counterparts in other government agencies, military and civilian, and in voluntary and private institutions and organizations, the Public Health Service is peculiarly able to render this type of assistance.

The Kansas-Missouri Flood

The Public Health Service's participation in emergency assistance during the Kansas-Mis-

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souri flood in the summer of 1951 was typical. When it became evident that a flood of disaster proportions was impending, the Surgeon General designated the Public Health Service regional medical director at Kansas City to supervise and coordinate Public Health Service activities. At the same time, the Communicable Disease Center dispatched necessary technicians and equipment to the flood area from various Communicable Disease Center field offices as well as from its headquarters at Atlanta. Technicians were made available also from the Public Health Service Missouri Drainage Basin Office and from miscellaneous other Public Health Service stations. During the period of the flood peak, some 70 Public Health Service specialists were assigned to duty in the flood area at the request of State health officials, including 3 medical officers, 23 sanitary engineers, 15 entomologists and other scientists, and 19 sanitarians. The work which they performed comprised emergency measures undertaken during the flood-peak period plus rehabilitation activities as the flood receded.

Emergency Measures

Of particular importance during the emergency was assistance in the restoration and maintenance of safe public water supplies. Portable water filtration and chlorinating equipment, some of which was flown into the area, was placed into use in communities where the normal water supplies had been temporarily inactivated, for example, at Ottawa, Kans., where the water supply plant was flooded out, and at Indian Creek in Johnson County, Kans., where the normal source of supply delivered from Kansas City had been interrupted. In other places, flooded pumping plants were dewatered and restored to service, and mains were disinfected with chlorine to eliminate contamination. Disinfecting chlorine compounds were furnished to residents in communities served by wells which had become flooded, for temporary use while the wells were being pumped out, sterilized, and returned to service. Arrangements were worked out with chlorine manufacturers to permit prompt shipment of extra supplies of liquid chlorine to the area had this become necessary. Special laboratory tests

were made—for example, at the Lawrence (Kans.) State Laboratory—to guide the work and to insure the continued safety of water supplies which had been subjected to contamination. Considerable work was also done in reactivating interrupted sewage disposal works, including pumping plants, to prevent further contamination of water supplies.

Other work accomplished during the emergency period included assistance in the maintenance of safe food and milk supplies at evacuation centers, furnishing and distributing medical supplies, including vaccines, and careful epidemiological surveillance to detect possible outbreaks of epidemics.

Rehabilitation Activities

The recession of the flood waters increased rather than decreased the scope of the environmental sanitation activities. A large number of Public Health Service personnel worked over a prolonged period in controlling insect breeding and nuisances. This work required the use of much insecticide spraying equipment and large supplies of DDT, chlordan, oil, and other insecticides, some of which were delivered to the area by air transport. Initial emphasis was placed on fly control to prevent the possible spread of diseases such as typhoid and dysentery; and later emphasis, on mosquito control to assist local authorities in preventing an abnormal incidence of potential disease vectors. Entomological experts supervised the work, after making on-the-spot surveys to determine what control measures would be most effective.

Another important problem facing local health authorities was the disposal of approximately 12,000 dead animals. This was accomplished principally by hauling the animals by truck to landfills for disposal by burial. Inspection of milk and food supplies was expanded to check all sources which had been subjected to contamination or spoilage, and to release only those products safe for consumption. Special measures were also taken to reinforce the normal rodent control programs of the flooded communities. Special checks of rat populations were made and rat poisons applied in those zones where rat populations were increasing because of migration or extraordinary exposure of food supplies. The importance of

these various continuing activities is indicated by the fact that 1 month after the flood peak several of the Public Health Service technicians were still on the job.

No abnormal incidence of any communicable disease was reported for any community in the area.

Legislative Authority

Authority for Public Health Service activities in assisting States at times of emergency is included in its authority for assisting States generally. Emergency assistance is customarily provided through the loan of specifically qualified personnel on State request under section 214 of the Public Health Service Act (Public Law 410, 78th Cong.).

More generally, section 311 of this act directs the Surgeon General to assist States and their political subdivisions in the prevention and suppression of communicable diseases and in the enforcement of local health regulations; also, the Interstate Quarantine Regulations of the Service, issued under section 361 of the act, authorize the Surgeon General to take special measures to prevent the interstate spread of the more important communicable diseases.

In the event of emergency or disaster, the President, under section 216 of the Public Health Service Act or under the Disaster Relief Act of 1950 (Public Law 875, 81st Cong.) may direct the utilization of the specialized personnel, equipment, and other facilities of the Service.

Financing Emergency Assistance

The Public Health Service has available, in the amount of \$40,000 annually, a special disaster and epidemic control fund, which is administered within the Communicable Disease Center of the Public Health Service. In years when one or more major disasters occur, especially disasters such as floods which create relatively great public health problems, this sum has not been adequate to meet the needs. In every instance, however, the Public Health Service has responded to requests from States to furnish at least the bare minimum of assistance necessary to prevent epidemics. Whenever necessary the Public Health Service has, with proper authority, utilized resources from regular operating programs—the emergency needs of States being given special priority in the sense that the prevention of mass epidemics is a Service function of the very highest importance.

Enactment of the Disaster Relief Act makes it possible for additional funds to be made available to finance Public Health Service emergency operations. The availability of such funds constitutes a kind of "insurance" and should make possible the undertaking of all essential emergency relief operations with a minimum of apprehension as to effects on regular program operations. And most important, the availability of funds through this act, in the form of grants to stricken communities will expedite their own recovery activities; thus the conditions which create major health hazards may be more quickly corrected.



A Preventive Medicine Screening Program in a Venereal Disease Clinic

By GERALD J. GRUMAN, M.D.

Many patients seen at the State of Kentucky Prevention and Control Center are discovered to have other health problems besides the venereal disease for which they were referred. In the past these patients were dealt with on an informal basis. However, the staff lately has attempted to organize this side of its work into a formal program of preventive medicine. The program costs nothing extra.

Each patient (other than those diagnosed as having gonorrhea) is given a thorough physical examination. This includes: funduscopic examination; breast, pelvic, and rectal examinations in all women; and rectal examination in all men over forty. Each patient presenting an emotional problem is given a 30-minute interview when it is possible. If this procedure reveals the need for diagnosis or treatment of nonvenereal conditions, the patient is referred to a public or private facility. The patient is given a sealed letter describing his venereal disease status and reasons for referral.

Frequently we discover neglected nonvenereal problems in gonorrhea patients. With our present facilities it is impracticable to do a complete physical examination on each gonorrhea patient. Therefore, our data on gonorrhea patients are not included in this report.

A study of records for 2 months reveals that 259 nongonorrhea patients have been seen in the clinic and have received the physical examination described above. The examination of these 259 patients revealed the presence of a neglected nonvenereal condition in 50 patients (19 percent).

The suspicion of cancer in most cases was aroused by the presence of nodules or masses in the breast, prostate, cervix, uterus, or ab-

domen. The urologic conditions were mostly nongonorrheal prostatitis. The psychiatric problems were related to sexual impotence, homosexuality, or syphilophobia. The skin conditions were venereal warts, scabies, and contact dermatitis. The eye conditions were refractive error and pterygium. The gynecologic conditions were prolapse of the uterus and monilial vaginitis. The neurological conditions were polyneuritis and epilepsy. The vocational rehabilitation problems were related to blindness and neuromuscular disability following trauma. The other conditions included precocious puberty, peptic ulcer, respiratory infections, and perineal abscesses.

Nonvenereal conditions	Patients
Suspicion of cancer-----	19
Urologic-----	6
Psychiatric -----	5
Skin -----	4
Eye -----	2
Gynecologic -----	2
Neurological-----	2
Vocational rehabilitation problems-----	2
Others -----	8

By systematizing the nonvenereal aspects of our work, we have been enabled to see a definite pattern. Certain gaps are revealed which suggest amendments to the original plan. For example, with very little trouble, we could give dental referral slips to patients with caries. (Nearly 100 percent of our patients reveal signs of poor dental hygiene.) We could refer many youngsters for circumcision. Our vocational rehabilitation work readily could be expanded.

The diagnosis and treatment of venereal disease is being done more and more by small prevention and control centers like ours. The results of our program give an interesting indication of what can be accomplished by such a small staff dealing with patients on an outpatient basis only. We do not have any laboratory facilities for X-rays or urinalyses. Yet, a thorough history and physical examination of 259 patients were enough to reveal to us more nonvenereal health problems than we could possibly handle.

The records reveal another interesting situation: Of the 50 patients described above, 40 were referred to private practitioners of their own choice, and 10 were referred to public facilities. Thus 16 percent of all the patients ex-

Dr. Gruman is a commissioned officer of the Public Health Service. He is now stationed at the State of Kentucky Prevention and Control Center, Louisville.

amined in our public clinic were referred to private practitioners because of nonvenereal conditions.

The reporting of these patients with our letters of referral is creating an increased feeling of good will among the private practitioners towards the venereal disease clinic. Also, the appearance of the patient with his letter is a means of acquainting the private physicians

and the community health and welfare personnel with the fact that a venereal disease clinic exists and performs various important functions. Thus, by carrying on a preventive medicine screening program in a systematic manner, a specialized clinic is helping to create that organic network of interrelated services and that climate of good will and cooperation so necessary to the community's public health system.

Dr. Candau Appointed WHO Director-General

Dr. M. G. Candau of Rio de Janeiro, Brazil, was appointed Director-General of the World Health Organization by the Sixth World Health Assembly on May 11, 1953. Dr. Candau, who will serve for a 5-year term beginning July 22, 1953, succeeds Dr. Brock Chisholm. Dr. Candau is presently deputy director of the Pan American Sanitary Bureau, Washington, D. C., the regional office for the Americas of the World Health Organization.

The Sixth World Health Assembly convened at Geneva, Switzerland, on May 5, 1953. The World Health Assembly is the supreme legislative body of the World Health Organization and meets once each year. A 16-member delegation represented the United States at the Assembly. Surgeon General Leonard A. Scheele of the Public Health Service was the chief delegate and chairman of the United States delegation. Other members included—

Delegates: Leonard W. Larson, M.D., member, Board of Trustees, American Medical Association, Bismarck, N. Dak., and Franklin D. Murphy, M.D., chancellor, University of Kansas.

Alternate delegates: Henry van Zile Hyde, M.D., and Frederick J. Brady, M.D., respectively chief and international health representative of the Division of International Health, Bureau of State Services, Public Health Service; also, Howard B. Calderwood, specialist in international organization, Office of United Nations Economic and Social Affairs, Department of State.

Congressional advisers: Congressman Homer D. Angell of Portland, Oreg., and Congressman Wayne L. Hays of Flushing, Ohio.

Advisers: Knud Stowman, Ph.D., international health representative, Division of International Health, Bureau of State Services, Public Health Service; Robert T. Stormont, M.D., secretary, Council on Pharmacy and Chemistry, American Medical Association, Chicago; Carl N. Neupert, M.D., State health officer, Wisconsin State Board of Health, Madison; Col. Thomas F. Whayne, MC, USA, chief of preventive medicine, Department of the Army; Ruth Sleeper, director, School of Nursing and Nursing Services, Massachusetts General Hospital, Boston; and Carol C. Laise, Division of International Administration, Department of State.

Henry F. Nichol was secretary and Mason A. LaSelle was administrative officer of the delegation. Both are with the Resident United States Delegation for International Organization Affairs at Geneva.

Oral Manifestations of Occupational Origin

The purpose of this compilation, the foreword states, is to bring together information relating to oral conditions which are associated with occupations, to make such material more readily available to dentists and other interested persons or groups.

The articles are arranged according to category of exposure, namely, acids, bacteria, dusts, gases, inorganic substances, metals, organic compounds, and physical factors. Articles referring to several types of exposure are classified under "General Review." Occupational cancer has been placed in a separate category. The types of exposure within each category are listed alphabetically. In those instances where more than one article is presented for a specific exposure, the listing is in reverse chronological order with the more recent articles appearing first. Numbers following listed headings refer to item numbers, which run consecutively throughout the publication. An author index follows the abstracts.

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Walters, F. J., Fridl, J. W., Nelson, R. L., and Trost, J. W.: *Oral Manifestations of Occupational Origin—An Annotated Bibliography*. Public Health Bibliography Series No. 7 (Public Health Service Publication No. 228). 41 pages. 20 cents.

Guide to Health Organization in the United States

A panoramic view of the entire health structure of our Nation is contained in this pamphlet, the preface states. The authors point to the contributions of Federal, State, and local official and voluntary agencies, and of private physicians, dentists, and nurses. The salient functions of the many agencies which

give health services in the United States are brought together in a simple brief form.

The pamphlet, first issued in 1946 and reprinted in 1948 and 1950, as "Guide to Health Organization in the United States—Miscellaneous Publication No. 35," has been used widely in orienting professional public health workers, visitors from other countries, and American students to the multiple systems of health service. It has also proved to be a concise and readable source of information for the general public.

Because of the substantial changes which have taken place during the past 5 years—both in content and in organization of public health services—the "Guide" has been revised in this second edition to reflect the public health picture of 1951. Substantive changes have been restricted to those necessary to bring the material up to date and those indicated by experience in using the first edition. To guide those who wish a more detailed and comprehensive grasp of the organization and administration of health services, an extensive bibliography is appended.

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Mountin, J. W., and Flook, E.: *Guide to Health Organization in the United States*. (Public Health Service Publication No. 196) 1953. 104 pages; charts; tables. 30 cents.

National Heart Institute

Text, charts, statistics, and photographs tell the story of the programs and work of the National Heart Institute which was created under the National Heart Act of June 16, 1948. Twin goals of the heart program are: (1) to find new and better ways of preventing, diagnosing, treating, and curing heart disease, and (2) to see that what is already known (and what is discovered by research) is fully applied to reduce death, disability, and suffering caused by heart disease. Funds are appropriated by the Congress to carry out the work of the National

Heart Institute and are allocated for National Heart Institute research; research grants; research fellowships; clinical traineeships; teaching grants; control grants to States; technical assistance in control; review and approval of grants; and program direction and administration.

The National Heart Institute, a part of the National Institutes of Health, Public Health Service, conducts an integrated program of research in its own laboratories and in cooperating institutions. The grants for medical research are made to universities and hospitals all over the country; to individual scientists to carry out important heart disease research projects; for construction of additional vitally needed research facilities; and for specialized training in cardiovascular diseases. The research fellowships program helps to relieve the scarcity of well-trained scientists in the heart disease field; and clinical traineeships are available to doctors under 40 years of age who have completed a year's general internship and an additional year of training and experience. Teaching grants make it possible for medical schools to coordinate and improve instruction in subjects on heart disease, and technical assistance provided through the heart section of the Division of Chronic Disease and Tuberculosis of the Public Health Service aids the States in technical matters relating to heart disease control measures. Pilot studies are conducted to determine the best methods and techniques for developing and operating a community heart program. These are actual field demonstrations in heart disease control, carried out in cooperation with State and local health departments and medical societies.

The inside front cover of this booklet quotes the purpose of the National Heart Act, and the inside back cover shows a chart of the structure of the Public Health Service heart program.

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National Heart Institute. (Public Health Service Publication No. 241) 1953. 24 pages; illustrations. 15 cents.

A Draft Act Governing Hospitalization Of the Mentally Ill

From time to time, State officials, lawyers, judges, and members of the medical profession have suggested the need for a model statute incorporating widely accepted concepts of legal and medical procedure for hospitalizing the mentally ill. In response to this need, and in view of the interest shown by the State governors at their annual conferences, the National Advisory Mental Health Council requested the Federal Security Agency to prepare a draft of such legislation. A working committee, staffed by medical and legal representatives of the National Institute of Mental Health, St. Elizabeths Hospital, and the Office of General Counsel, assisted by a special consultant, formulated the work that is known as *A Draft Act Governing the Hospitalization of the Mentally Ill*. Some 40 outside medical and legal authorities were consulted for their views during the planning period. In September 1950, a draft of the suggested legislation was transmitted to all of the State governors.

In brief, the legislation proceeds on the philosophy that the mentally ill are sick persons and that society, in depriving them of their freedom, is obligated to assure that procedures for their hospitalization, particularly those individuals whose condition renders them incapable of making decisions, should be surrounded by equitable safeguards. Under the provisions of the suggested legislation, the mentally ill would be spared public humiliation, degrading or emotionally harmful treatment, and their commitment would be free of any penal connotations. Restrictive obstacles to prompt medical care would be removed through provisions in the legislation for permitting voluntary admission upon medical certification.

In September 1952, certain portions of the text, and, in some cases, the terminology, were revised to strengthen the original concepts of the legislation and to clarify the language where it might be ambiguously interpreted. The revision was completed after intensive review and discussion of the proposed changes by the original working committee. In this work, the committee exchanged views with medical and legal authorities of the National Association for Mental Health, Inc., a voluntary, non-profit organization. Two very important changes in the revised edition are the clarification of the basic criteria for identifying individuals in need of hospitalization and procedures covering the admission of individuals in emergency medical situations. Among the other revisions are several that emphasize the importance of assisting the patient to maintain his morale during hospitalization and subsequent convalescence.

A Draft Act Governing Hospitalization of the Mentally Ill. (Public Health Service Publication No. 51). Revised 1952. 36 pages. 15 cents.

Directory of Full-Time Local Health Units—1952

Revised as of July 1952, this directory contains a listing of full-time health units serving local areas, together with the name of the health officer of each unit or other designated administrative head, and headquarters location.

A full-time health unit is one officially organized to provide medical, nursing, and sanitation public health services during the regularly scheduled work week of the governmental unit to which it is attached and which is under the direction of a full-time health officer or other designated full-time administrative head.

The information is arranged alphabetically by State and by type of health organization: local units (county, city, and local district) and

State districts (either rendering actual local services or providing supervisory and advisory services).

The number of full-time units rendering local health service with the number of counties served, and the full-time units with the position of health officer vacant or temporarily filled by a neighboring health officer are summarized in the appendixes.

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Directory of Full-Time Local Health Units—1952. (Public Health Service Publication No. 118) 1952 revision. 63 pages. 25 cents.

Help Fight Pollution Now

Designed for display at State fairs, conventions, conferences, libraries, and other places, this five-color 3- by 4-foot poster stresses the necessity of the abatement of water pollution and the conservation of our water resources for home use, industry, agriculture, and recreation. It also has been used as the central panel of a larger exhibit which points out the responsibility of the community and of industry in preventing water pollution (see the November 1952 issue, *Public Health Reports*, p. 1087). The poster shows in one corner a desert scene with the whitened bones of an animal beside a dry water hole. This picture bears the legend, "Polluted water is almost as bad as no water." The central portion pictures a stream being polluted by industrial waste from factories on its banks. A banner across the center states, "Clean up water for . . ." and points to a series of five pictures showing water uses. The words, "Help Fight Pollution Now" appear across the bottom of the poster.

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Help Fight Pollution Now. (Public Health Service Poster No. 5) 1952. 3' x 4', colored. Available upon request from the Division of Water Pollution Control, Public Health Service, Washington 25, D. C. For sale in quantity by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 25 cents each.

Achievements in Public Health

July 1, 1951-June 30, 1952

PROGRESS in the field of public health during the fiscal year 1952, as reflected through the activities of the Public Health Service, is delineated in some detail in the eightieth Annual Report of the Service. Continued success in controlling acute communicable diseases, the opening of new fields of knowledge through research, expansion of the Nation's network of hospitals, and intensification and broadening of State and local health activities are salient among the accomplishments noted. The Public Health Service, in partnership with State and local health departments and in cooperation with other health agencies and organizations, has contributed much to these, as well as many other, achievements of the year.

Health Status

In 1951, for the fourth consecutive year, the death rate was below 10 per 1,000 population. Death rates from infectious diseases have continued the steep descent which began in 1900. The tuberculosis death rate was at a record low of 19 per 100,000 population; the rate for syphilis was 5 per 100,000; and the combined death rate for the principal communicable diseases of childhood was less than 2 per 100,000. Chronic diseases, first claiming their place as chief causes of death in 1914, today represent the greatest challenge in health. Adequate prevention of these diseases will require intensive efforts of all members of the health professions.

Medical Research

The immediate program of expansion in organization, in facilities, and in scope of activity

which began in 1948 for the National Institutes of Health, the center of the Service's medical research activities, neared completion in fiscal 1952. A milestone in this record of progress will be the opening of the Public Health Service Clinical Center in 1953. The Clinical Center will provide unique facilities for the medical practice-medical research-public health team to coordinate the study of chronic and crippling diseases.

The past year has also witnessed valuable contributions to medicine and public health by scientists in all seven of the Institutes as well as by many nongovernmental scientists in universities, hospitals, and other research institutions who have been aided through research grants and fellowships. The Annual Report describes a number of the research findings of the year.

Public Health Resources

With conservation a basic principle, the Public Health Service is contributing to the expansion of the Nation's health resources and at the same time providing important advisory and technical assistance in the endeavors of our health organizations to make maximum use of existing resources in personnel, facilities, and materials.

Acting as claimant for the Controlled Materials Plan, which went into effect July 7, 1951, the Service played an important part in sustaining health facility construction. Facilities estimated at \$781,000,000 were added to the Nation's health resources in fiscal 1952, setting a new high mark in civilian construction. Through the Public Health Service, Federal funds for loans or grants were made available for construction of various community health

facilities in critical defense housing areas and for hospital construction throughout the Nation. The Service also provided information and consultation on many problems of hospital operation, health manpower utilization, and hygiene of housing. Studies of the prevalence and severity of disabling illness were undertaken as part of the Service's contributions to the conservation of manpower resources of the Nation.

Health Services

Helping States and communities discharge their responsibilities for the maintenance and improvement of health is one of the major jobs of the Public Health Service. Centered in the Bureau of State Services, assistance includes both grants of funds and direct Federal technical services. These include collection and analysis of health data, consultation on specific problems, and field studies and demonstrations to develop and test new methods.

Grant-in-aid payments made in fiscal 1952 amounted to \$31,626,412. Technical, investigative, and consultative assistance in the form of surveys and studies, case-finding projects, laboratory services, training services, and program planning and development was provided in the fields of health education, public health nursing, environmental health, occupational health, disease prevention control, and dental health.

The Public Health Service also provides, as directed by law, medical and hospital care for specific groups, including merchant seamen. Over 500,000 beneficiaries received treatment

during the year at the 22 hospitals, 19 outpatient clinics, and more than 100 outpatient offices of the Service. In addition, the Service assigns health personnel to other Federal agencies to aid them in carrying out their health programs: Office of Vocational Rehabilitation, Bureau of Employees' Compensation, Bureau of Prisons, United States Coast Guard, Maritime Administration, Bureau of Indian Affairs, and the Department of State.

World Health

By the assignment of public health experts to the technical assistance missions sponsored by the Mutual Security Agency and the Technical Cooperation Administration, the Public Health Service plays a leading role in developing and operating health programs of these missions. During 1952, such programs were in operation in 16 countries—Burma, Formosa, Greece, Indochina, Indonesia, Philippines, Thailand, Turkey, India, Iran, Iraq, Israel, Jordan, Lebanon, Liberia, and Libya—and plans were developed for establishment of programs in 14 other countries. The Service also continued to serve as official liaison with the World Health Organization and the Pan-American Sanitary Bureau. The Surgeon General was president of the Fifth World Health Assembly, which met in May 1952.

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Annual Report of the Public Health Service, Federal Security Agency, 1952. 89 pages. Price 30 cents.



Rabies

A leaflet on rabies warns that this disease is widespread among animals in the United States and in recent years has been on the increase. Rabies affects the nervous system, including the brain and

spinal cord, of animals and man, and once developed, it is always fatal.

The virus causing rabies may be transmitted by the bite of an infected animal if the saliva of the infected animal comes in contact with an open wound. All warm-blooded animals may contract the disease and spread it. Recently foxes have showed an increase in rabies incidence. Dog bites account for 90 percent of the human cases of rabies in the United States.

The leaflet describes two types of rabies, symptoms of each type, incubation periods, and the progression of the disease in humans and in animals. It tells what to do with a dog suspected of being rabid. It offers pointers for preventing rabies and stresses them because the disease cannot be cured.

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Rabies. Health Information Series No. 30 (Public Health Service Publication No. 97) 1952. 2-fold leaflet. \$1.50 per 100.

2d Conference of Mental Hospital Administrators and Statisticians—Proceedings

To assess accomplishments of activities of State mental hospital statistics, comparable statistics on patients treated in such systems are needed. At present, the kinds of data produced by the different States lack uniformity and comparability.

At the Second Annual Conference of Mental Hospital Administrators and Statisticians, called by the National Institute of Mental Health of the Public Health Service on February 25-27, 1952, some of the many problems of standardization of reporting which were discussed dealt with definitions, nomenclature, and tabulations. Conferees represented the 11 States grouped into a model reporting area for mental hospital statistics at a first conference in 1951. These States are: Arkansas, California, Illinois, Louisiana, Michigan, Nebraska, New Jersey, New York, Ohio, Pennsylvania, and Virginia.

In mental hospital systems there is lack of uniformity in definition of terms, such as first admission, resident patient, transfer, and so forth, used to describe the movement of patients into and out of the hospital. For example, in some States, first admissions relate to a particular State hospital; in other States to a particular State hospital system; in still others to any State hospital system; and in the remainder to treatment for mental disorder anywhere.

Comparable data are not always available in different States even on such basic items as length of hospitalization of discharged mental patients by diagnosis, age, sex, and other factors. Methods used for analyzing data have not always been appropriate to the long-term nature of mental illness. These and other difficulties have made it impossible, according to Dr. Morton Kramer, chief of the biometrics branch of the National Institute of Mental Health and chairman of the 1952 conference, to demonstrate satisfactorily the accomplishments or failures in treating the mentally ill.

In a foreword to the published proceedings of the second conference, Dr. R. H. Felix, director of the National Institute of Mental Health, expressed the hope that the progressive thinking of the 11 States will stimulate other States to develop and expand their statistical offices and to collect and tabulate data in a uniform manner so as to meet the standards for inclusion in the model reporting area. At the conference, it was generally agreed that to meet the minimum requirements for inclusion, a State should have a central statistical system supervised by a professional statistician, should agree to the definitions adopted by the model area, and should agree to produce annually the minimum number and type of tables agreed upon by the model area States.

Conferees agreed on definitions for first admission and resident population. They also agreed to exchange ideas concerning needed data; to permit a review of their States' programs of statistics and research in mental hospitals; to develop an effective system of statistical reporting to the National Institute of Mental Health; to continue to form the nucleus of a model area; and to urge the extension of uniform reporting methods to all States.

Included in the 13 appendixes to the proceedings are tables comparing data on first admissions in New York State in 1914 with 7 other States in 1948; a study on services and treatment facilities for mental patients in general hospitals; a study on discharges from the psychiatric division at Bellevue Hospital, New York City; a plan for a census of patients in mental institutions on a cyclical basis; a paper on standard control groups for the evaluation of therapy; and another on suggested cohort studies of first admissions.

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Proceedings of the Second Conference of Mental Hospital Administrators and Statisticians. (Public Health Service Publication No. 266) 1953. 77 pages; appendixes; tables. 40 cents.

Salaries of State Public Health Workers

This study, the sixth of a series of annual studies of salaries paid to selected classifications of personnel employed by State health departments, includes full-time professional personnel—medical, nursing, sanitary engineering, sanitation, nutrition, health education, statistical, laboratory, business management, dental, and veterinary. The data were obtained from State health department payrolls for August 1952.

Information on salaries paid State health officers, five selected nonmedical program directors, and personnel in the occupational groups listed above is presented by bar graphs. For the convenience of those desiring more detailed information, tables showing salary distribution by States are included for all of these occupational groups except business management officers, health educators, nutritionists, and statisticians.

General salary increases between August 1950, August 1951, and August 1952 are shown for nine occupational groups. For these nine groups the average percentage increase in the lower limits of the salary intervals in which the median appeared was approximately 6.5 percent. Two occupational groups, dentists and veterinarians, were added to the study this year. The salary intervals within the median salaries which appeared in 1950, 1951, and 1952, and the percentage changes in the lower limits of the salary intervals in which the median appeared in 1947, 1948, 1949, 1950, 1951, and 1952 are shown by tabular listings.

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Salaries of State Public Health Workers, August 1952. (Public Health Service Publication No. 260) 1952. 52 pages. Prepared in cooperation with the Association of State and Territorial Health Officers and the American Public Health Association. A limited number of copies available from the Division of State Grants, Public Health Service, Washington 25, D. C.

Diphtheria

Diphtheria, a dangerous disease, can be prevented. Knowing something of what diphtheria is like will help one to understand why it is important to guard against it. This leaflet tells of diphtheria epidemics as late as the 1880's, and of the protection of inoculation which has resulted in far fewer deaths from this disease now. What diphtheria is like, how the germs behave, how the disease gets around, and how to stop it before it starts are explained. Emphasis is placed on immunization for every baby and when to call the doctor.

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Diphtheria. Health Information Series No. 37 (Public Health Service Publication No. 60) 1953. 2-fold leaflet. \$1.50 per 100.

Louse Infestation

Lack of personal cleanliness is one of the most common predisposing causes of infestation with the three varieties of body lice discussed in this health information leaflet. The leaflet describes the head louse, the body louse, and the pubic or crab louse, and the manner in which their presence is detected. Consultation with a physician is advised for proper treatment, and scrupulous care and cleanliness for the prevention of the recurrence of the lice.

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Louse Infestation. Health Information Series No. 26 (Public Health Service Publication No. 103). Revised 1952. 1-fold leaflet. 5 cents; \$1.50 per 100.

Hypertension

Only a doctor can tell by physical examination whether you have high blood pressure, and whether it's serious enough to need attention. People who worry too much over unsolved problem are often susceptible. Heredity is probably a factor, and the condition occurs most often

in persons between 30 and 50 years of age. High blood pressure, or hypertension, is a common disorder which shows up in the heart and blood vessels. In itself, high blood pressure is not a disease, but a sign of something wrong. If blood pressure remains consistently high for a long period of time, however, it can result in serious damage to the heart, the kidneys, and other organs of the body.

There are undoubtedly millions of persons in the United States who have high blood pressure and don't know they have it. Headaches and dizziness may be symptoms, but can be symptoms of other conditions, or there may be no symptoms at all. One can have high blood pressure without being ill or in danger of a sudden breakdown of the heart or arteries.

These statements are made with others in this health information leaflet to explain to the person who may have high or low blood pressure the need to get under a doctor's care and follow a few simple rules for moderate living so that he may be able to continue to work and enjoy life.

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Hypertension. Health Information Series No. 69. (Public Health Service Publication No. 146) 1952. 2-fold leaflet. \$1.25 per 100 copies.

Trichinosis

The major emphasis in this health information leaflet is on the fact that trichinosis, caused by eating raw or insufficiently cooked pork, is preventable. Pork is a wholesome, flavorful food, and there is no reason why it should not be a part of the diet, but it must be cooked thoroughly.

The leaflet explains how long meat should be cooked and how it can be tested to see if it is done. Some processed meats are treated to kill the trichinae, and the reader is advised to look for the stamp which indicates that the meat has been federally inspected and passed. Another means of prevention which is discussed is the cooking of garbage that is fed to hogs.

The leaflet also contains information on the way in which the trichinae affect the body, the symptoms of the disease, and the forms of treatment.

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Trichinosis. Health Information Series, No. 47 (Public Health Service Publication No. 101) reprinted 1952. 2-fold leaflet. 5 cents; \$1.00 per 100 copies.

Tularemia

Bacterium tularensis produces in certain infected animals peculiar spots in the spleen, liver, and bone marrow, with enlargement of and abscess formation in the lymph glands. This disease, tularemia, man acquires through the handling of dead animals, or by eating the undercooked flesh of an infected animal, or by being bitten by an insect which has previously fed on a diseased animal. The commonest history of a human case is that of the person who has handled the carcass of an infected rabbit. This leaflet states that prevention of tularemia is almost entirely a matter of personal precaution and tells how to take such precautions.

The mode of infection is briefly described, as is the incubation period of the disease. Diagnosis can be aided by certain tests, the leaflet states. Streptomycin has been employed and found to be of great value in the treatment of tularemia when used early in the course of the disease.

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Tularemia. Health Information Series No. 44 (Public Health Service Publication No. 135) 1-fold leaflet. \$1.25 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Tuberculosis Cases Known To Health Departments

By ROBERT J. ANDERSON, M.D., HERBERT I. SAUER,
and ROGER L. ROBERTSON, M.A.

HOW MANY tuberculosis cases are known to health departments in the United States? Are they receiving needed public health supervision; that is, are they receiving periodic medical examinations, laboratory services, and the instruction necessary to prevent further spread of tuberculosis?

Ideally, one of the best measures of the tuberculosis problem in the United States lies in true prevalence, that is, the total number of cases at a given time. For it is these cases which, in the aggregate, represent the actual and potential reservoir of infection and which require case-finding facilities, public health supervision, and medical care in order to prevent or alleviate disability and economic loss from the disease.

In the absence of data on true prevalence, public health workers have for many years attempted to measure the size of the tuberculosis problem and the progress made against it in terms of mortality—the number of tuberculosis deaths occurring annually. Declining tuberculosis mortality rates, however, are probably a poor index of changes in prevalence, since they partially reflect declining case fatality rates resulting from earlier and more effective case finding and treatment. Declining case fatality rates and a continuing high level of morbidity reporting tend, in turn, to maintain known prev-

alence at a high level, since cases of a type which previously terminated in early death now go on, after an extended period of treatment, to an arrested state. These cases, with the ever present opportunity for reactivation, are thus actually present in our population for longer periods than previously.

The true prevalence of tuberculosis can only be estimated. Until recent years, there have been very few counts of the number of known cases, even for large local health departments. Now, with increased use of tuberculosis case registers in various parts of the country, more information is becoming available regarding known cases and their supervision.

In the past, most data on tuberculosis morbidity have been on cases newly reported during a given year. This present study, however, deals with known prevalence—the total number of known tuberculosis cases as of a specified date—and with the public health supervision of those cases. By definition, known prevalence includes all cases which are considered by the health department at the date of tabulation to be significant for supervision, even though these cases may have been first reported as new cases many years previously. This includes not only active tuberculosis cases but also those with activity undetermined, arrested tuberculosis, or inactive tuberculosis which the health department considers significant for supervision. Known prevalence should not be confused with true prevalence, since the latter includes also estimates of the number of unknown cases in a specified area.

Dr. Anderson is chief of the Division of Chronic Disease and Tuberculosis, Public Health Service. Mr. Sauer and Mr. Robertson are statisticians in the division.

Recent estimates of prevalence which have appeared elsewhere have been based in part on the preliminary summaries of data presented in this report (1, 2).

Sources of Data

Reports used in this study bear various dates between January 1949 and January 1953. Included are reports from 19 entire States (except for 4 local health departments whose reports are tabulated separately because their tuberculosis control programs are administratively separate from the States'), districts in 2 States consisting of a number of counties in each, and 47 local health departments. Thus there is included a total of 72 areas presenting data on one or more aspects of the problem here discussed. These areas account for approximately 50 percent of all tuberculosis deaths and 46 percent of the total population in the United States. In all, 38 States and the District of Columbia are included either wholly or in part.

Statistical reports from a specific administrative level (State, district, or local) were included in this study only when there was known to be a definite policy and practice at that level of obtaining information on the supervision of cases and their current status. Generally, the reports used were prepared on the tuberculosis case register summary report, for the most part in accordance with recommended instructions (3). However, since these reports were prepared by individuals in many different health departments, there were undoubtedly some variations in the procedures used. In summarizing these reports, every attempt has been made to include from each only those data which were reported in accordance with accepted practice or which could be made comparable by a minimum of editing. It is for this reason that there is variation in the number of areas reporting each type of information tabulated.

Of the 72 areas for which data were available, 22 are places in which communitywide chest X-ray surveys have been conducted in cooperation with the Public Health Service. While the remaining 50 areas have had some X-ray case-finding activities, the proportions of the populations X-rayed have generally been much

smaller. Comparisons between the areas with more intensive case finding and areas with less intensive case finding are presented throughout this paper. It seems likely that the differences noted reflect the effects of the X-ray surveys and the intensification of tuberculosis control efforts resulting therefrom. However, there is no absolute assurance of this, since the surveyed areas are not statistically representative of all areas for which data are available. Nevertheless, certain comparisons may be made which appear meaningful. For example, comparisons of known prevalence rates in surveyed areas with those in nonsurveyed areas probably are sound enough to permit some conclusions as to the effects of communitywide surveys.

Known Prevalence

In the 72 areas included in this study, there were 233,028 tuberculosis cases known to health departments and considered by the health departments to be significant for supervision, a rate of 339 known significant cases per 100,000 population (table 1). As is also indicated in

Table 1. Known tuberculosis cases and case rates in selected groups of health department areas

[United States, January 1949 through January 1953]

	Number of health department areas with data available	Population included in group of areas (as of Apr. 1, 1950)	Cases	Cases per 100,000 population
Total known cases-----	72	68,762,021	233,028	339
Survey areas-----	22	12,239,785	57,973	474
Other areas----	50	56,522,236	175,055	310
Active cases-----	56	45,343,259	72,185	159
Survey areas-----	22	12,239,785	21,725	178
Other areas----	34	33,103,474	50,460	152
Positive sputum cases at home-----	49	45,504,340	11,760	26
Survey areas-----	16	7,232,554	2,569	36
Other areas----	33	38,271,786	9,191	24
Hospitalized cases plus positive sputum cases at home-----	47	42,929,325	36,773	86
Survey areas-----	16	7,232,554	8,677	120
Other areas----	31	35,696,771	28,096	79

table 1, the areas which have had community-wide chest X-ray surveys had much higher rates of known significant tuberculosis (474 per 100,000 population) than did other areas (310 per 100,000 population). For individual areas the rates ranged from 50 to 1,800 cases per 100,000 population.

Aside from the true prevalence of tuberculosis in each area, factors which appear to influence the number of known significant cases are: (a) the extent and effectiveness of case finding and reporting, (b) the extent of efforts to maintain supervision of known significant cases, and (c) the promptness with which cases are dismissed. Some health departments, for example, dismiss a case merely because it is reported as lost, while others make a thorough search for the patient before discharging him as lost. Some health departments, too, find it administratively desirable to dismiss cases from the central register as soon as they are classified as inactive, while others may continue supervision until the cases have been arrested or inactive for 5 years.

Active Cases and Hospitalization

In 56 areas with information available regarding activity status, there were 72,185 active tuberculosis cases known to health authorities, or approximately 159 per 100,000 population. Among these areas there was a range from 30 to 1,227 known active cases per 100,000 population (fig. 1). Variations in these rates no doubt parallel variation in the true prevalence of tuberculosis more closely than do the rates for total cases known, since health department policies for keeping active cases in their case registers are more nearly uniform than those governing total significant cases (which include arrested cases).

Known prevalence of active tuberculosis is also influenced, however, by the extent and effectiveness of case finding and case holding. This is suggested by the fact that those areas which have had communitywide chest X-ray surveys showed 178 known active cases per 100,000 population, in comparison with a rate of 152 in the nonsurvey areas. Before the surveys, survey areas had rates similar to those of nonsurvey areas.

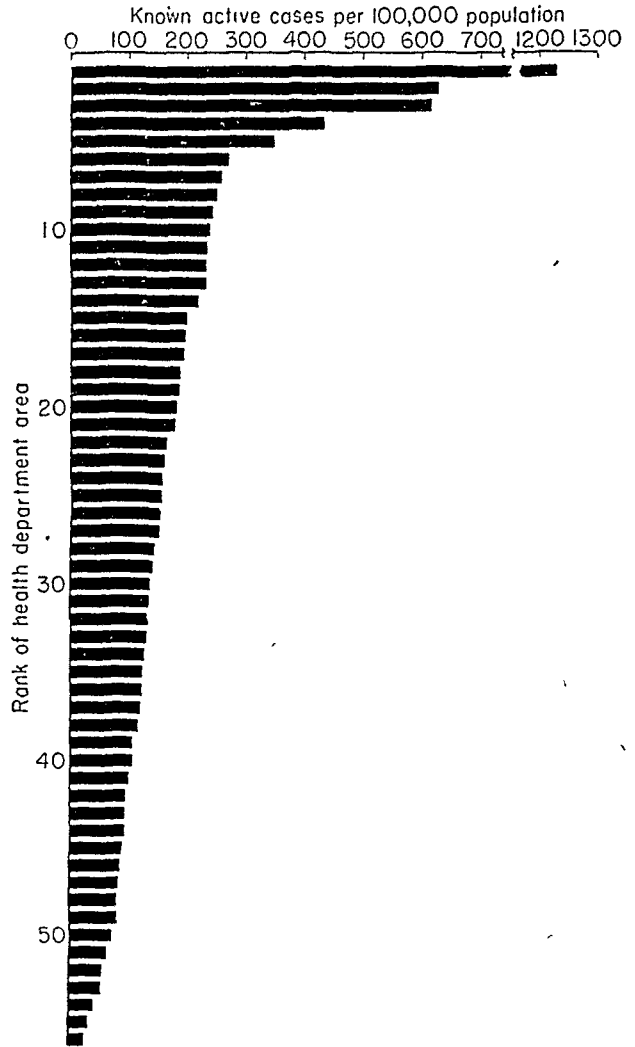


Figure 1. Known active tuberculosis cases per 100,000 population, 56 health department areas in the United States.

Cases were diagnosed as active with varying amounts of clinical proof. Those with positive sputum and those hospitalized for tuberculosis may be said to have the most clearcut evidence of active tuberculosis, and thus as a group may be said to be the more serious cases. In these terms, again the areas which have had communitywide surveys had higher rates than did the other areas: The cases hospitalized for tuberculosis plus the positive sputum cases at home amounted to 120 per 100,000 population in the group of survey areas, as compared with only 79 per 100,000 in the other areas (table 1).

Approximately 46 percent of the known active cases in the areas studied were hospitalized. In the area most acutely in need of more beds, only 20 percent of the known active cases

were hospitalized, while in the areas with sufficient numbers of beds, about 80 percent were hospitalized. One large area which was endeavoring to hospitalize all those needing such care had 74 percent of its known active cases hospitalized and still had a short waiting list. These and other data indicate that of the known active cases in a community, approximately three-fourths need and will accept hospitalization, and one-fourth will not be hospitalized at a specific time. This latter group of known active cases will include the few who are unwilling to be hospitalized or who have adequate care at home, those awaiting hospitalization, and those who have been hospitalized previously but whose disease has not yet been arrested. Since cases usually are known to health authorities before they are hospitalized, more complete information on numbers of known active cases may provide a means of indicating hospital bed needs for tuberculosis.

Positive Sputum Cases at Home

From the public health point of view, the cases usually considered most important are the positive sputum cases at home. These are the cases which have been definitely proved to be infectious and which, because they are at home, are in a position to spread tuberculosis to family and community. Information was available from 49 areas on the number of cases at home with positive sputum or other demonstrations of tubercle bacilli. In these areas, 11,760 such cases were known (table 1)—a rate of 26 per 100,000 population. In the surveyed areas, there were 36 cases per 100,000 population as compared with 24 per 100,000 in the other areas. In other words, in the areas with more intensive X-ray case finding, there were more cases at home known to have positive sputum, as well as more cases hospitalized.

Supervision of Cases

How effectively are known tuberculosis cases supervised? How frequently are they ignored as if they were unknown? The effectiveness of health department efforts to determine the sputum status of their known cases is shown in figure 2. Of 34,836 active and activity undetermined cases at home in 36 areas with appropriate data available, 14,965, or 43 percent,

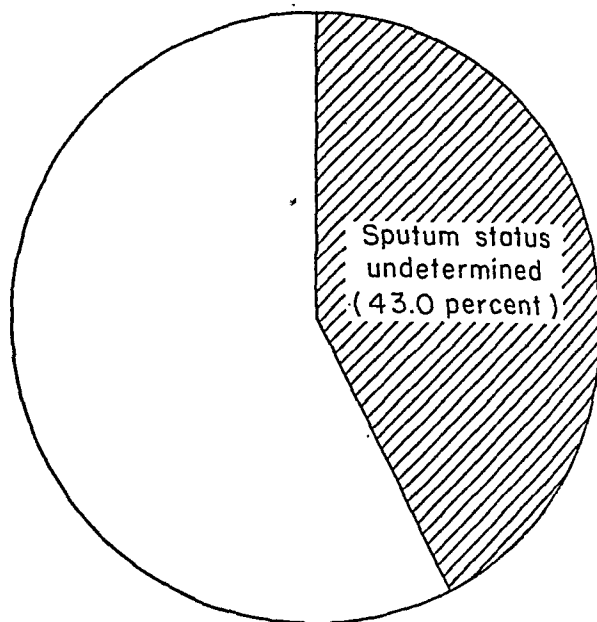


Figure 2. Sputum examination status of active and activity undetermined cases of tuberculosis at home.

were of undetermined sputum status. Communitywide chest X-ray surveys have been conducted in 14 of these areas, and reports reveal less than one-third of the active and activity undetermined cases at home with unknown sputum status, as compared to almost half in other areas.

Health departments generally have the policy of obtaining periodic reports regarding the supervision of significant cases in the tuberculosis case register. Another index of the effectiveness of supervision is the proportion of unhospitalized cases in the register for which the health department has had no examination report within the past 12 months. Although such information was available from only 28 of the areas included in this study, the data are nevertheless suggestive. A total of 47,110 tuberculosis cases at home were classified by examination status, and it was found that 15,815 of those cases, or 33.6 percent (fig. 3) had had no X-ray or clinical examination report within the preceding 12 months. While some of these patients may have been more recently examined, the health department had no information to show that they were receiving either medical or public health supervision.

Communitywide surveys had been conducted in 13 of these areas. For these 13 areas as a

group, 27 percent of the significant cases at home had not had an examination report within the preceding 12 months, as compared with 42 percent for the other areas. Only one community-wide survey area reported a higher than average percentage of cases without an examination report during the preceding year.

Often a distinction is made between the unknown cases in a community constituting sources of infection, and the known cases presumed to be under control and therefore not sources of infection. However, it is clear that there are still large numbers of known tuberculosis cases which, according to health department records, are not being supervised and are probably receiving little more attention from the health departments than are the unknown cases.

In a few areas, data on examination status of patients at home have been tabulated separately for the active cases on the one hand, and for the arrested and inactive cases on the other. It is rather surprising that the active cases at home in these areas show just as high a proportion of cases not recently examined as do the arrested and inactive cases. Since the supervision of active cases at home is generally believed to be far more important than that of the arrested cases, it would appear especially desirable to intensify efforts to obtain examination reports on known active cases.

Estimated Known Prevalence

As indicated earlier, data presented in the foregoing analysis apply only to those areas for which information was available for the 1949 to 1953 period. While these areas represent almost half of the population of the continental United States, they were selected on the basis of the reports available and therefore are not necessarily a random sample. Yet, to a considerable extent, these areas can be tested for representativeness on the following bases: (a) the racial distribution of the population; (b) the geographic distribution of the areas included; (c) the inclusion of areas both with organized local health units and those without; (d) the inclusion of both State and locally directed programs; (e) the adequacy of the tuberculosis control programs in the various areas included, as measured by various indexes, together with data obtained in the course of field

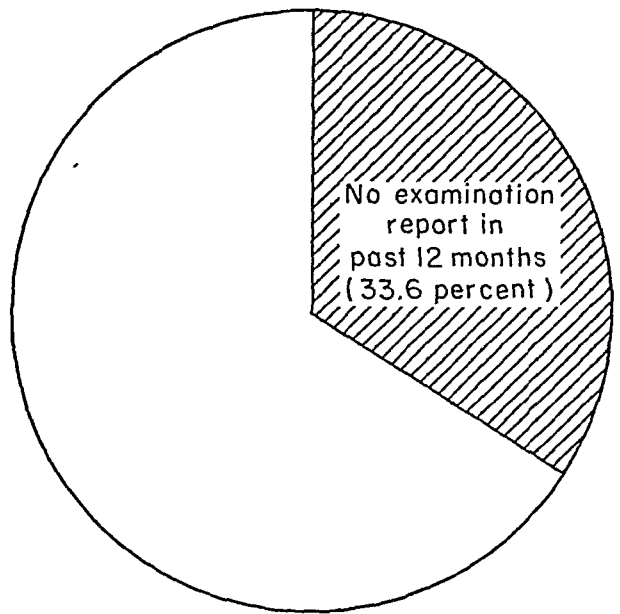


Figure 3. Recentness of medical examination report on known significant tuberculosis cases at home.

consultation; (f) the tuberculosis death rate; (g) the inclusion of areas which have recently had intensive X-ray case-finding surveys; and (h) the inclusion of populations in mental and penal institutions.

In each except the last three of these respects, the group of areas considered in the present study appears to be fairly representative of the continental United States. It was noted, however, that the areas as a group differ from the remainder of the United States in that they had a slightly higher tuberculosis death rate, a disproportionately large number of areas which have had communitywide X-ray surveys, and underrepresentation of the populations of mental and penal institutions. Careful attention has been given to the weighting of each of these three factors in estimating the prevalence of known tuberculosis cases in the continental United States.

By projecting the data contained in table 1, we can arrive at estimates of known tuberculosis prevalence in the continental United States, as follows:

Total known significant cases	450, 000 to 500, 000
Known active cases	225, 000 to 250, 000
Known positive sputum cases at home	35, 000 to 40, 000

These national estimates are probably the best informed guesses as to the size of the tuberculosis problem known to health departments throughout the country. As case reporting and supervision further improve, and as reports from health departments become more generally available, this type of data will become increasingly more meaningful as an index of our tuberculosis control problem.

Summary

1. Tuberculosis case register reports for areas comprising nearly half the population of the continental United States are analyzed.

2. In the areas studied, there was an average of 339 known significant tuberculosis cases and 159 known active cases per 100,000 population.

3. In 43 percent of the cases at home classified as active or activity undetermined, sputum status was unknown to the health departments reporting.

4. About one-third of the known significant cases at home had not had an X-ray or clinical examination within the preceding 12-month period, according to the health department records studied.

5. In the areas which have had community-wide chest X-ray surveys, prevalence rates for known significant cases and for known active cases were substantially higher than in other

areas. The communitywide survey areas had examined the sputa of a higher proportion of their patients and had maintained followup information more satisfactorily than had the non-survey areas.

6. It is estimated that there are almost 500,000 known significant tuberculosis cases in the continental United States, and that nearly 250,000 of them are active. Approximately 40,000 of these are known positive sputum cases at home, and there is an additional large number at home whose sputum status is undetermined.

7. In spite of the rapid decline in tuberculosis mortality, it is apparent that the disease remains a problem of very serious dimensions.

8. In view of the large proportion of cases for which both sputum status information and recent examination reports are lacking, it is apparent that the public health supervision of individual tuberculosis patients is inadequate in many areas.

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Correction

In the table, "Thirty-one community-wide X-ray surveys, 1945-53," p. 548, May issue, the figure in the last column for Milwaukee, Wis., should read 557.

Twenty-six Years of Cancer Control In Massachusetts

By HERBERT L. LOMBARD, M.D., M.P.H.

MORE THAN a quarter century of experience in cancer control is on the records of the Massachusetts Department of Public Health. With no precedent to follow, with no knowledge of the public health aspects of the disease, without even a clearcut idea that cancer was a public health problem, the State health department launched a cancer control program May 29, 1926.

At the 52d annual meeting of the American Public Health Association, Dr. Eugene R. Kelley, Massachusetts commissioner of public health, pointed out the need for: (a) determination by health department administrators of their proper niche in cancer control; (b) better statistical data on cancer facts and additional personnel and funds to enable health administrators to collect, collate, analyze, and diffuse these facts; (c) extended facilities for early diagnosis and stimulation of the professions to use these facilities fully; (d) better hospital facilities for the inoperable group of cancer patients; (e) new and efficient methods of arousing and retaining public interest in and understanding of the significance of cancer "whereby a large degree of success may be reasonably anticipated even with our present faulty weapons for combating the menace of malignancy."

Today about two-thirds of the States have

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Recognition of cancer as a public health problem has led to the development of control programs in all of the States, and in the Territories and insular possessions of the United States. Some of these programs are relatively long established and have evolved not only valuable epidemiological data, but important techniques for coping with cancer as a disease of public health importance.

Effective cancer control programs are distinguished by certain policies and practices uniform to all, and by provisions for meeting the special requirements of the particular area concerned. Such a program is that of the Massachusetts Department of Public Health, described in the accompanying article. *Public Health Reports* from time to time hopes to present reviews of other cancer control programs. That of the New York State Health Department was described in our December 1952 issue.

—THE EDITORS.

some State-supported service or facility specifically for cancer patients (1). But the requirements of cancer programs discussed by the commissioner of public health of Massachusetts in 1923 are still not met.

The component parts of a cancer program are varied, and there is a tendency toward selection of program activity by different units of the population. Physicians often limit the scope of activity to the care and treatment of cancer; sociologists interest themselves in problems connected with the inadequacy of services for those in the lower economic levels of society; individuals interested in research consider this

the all-important field; women's organizations interest themselves in education; statisticians tend to worry over death rates, age distributions, and the like, often forgetting other factors in the cancer problem; and public health workers think of the application of public health methods to cancer control.

The Massachusetts program, consisting of research, hospitalization, diagnostic clinics, tumor diagnosis service, and education, is based on the accumulation of experience gained largely through trial and error. Since Massachusetts was compelled to pioneer, all procedures have been subjected to evaluation in order to gauge their effectiveness.

Statistical Research

The statistical approach is fundamental in a public health program. From statistical studies, the Massachusetts cancer program received its inspiration, determined its scope, evaluated its activities, changed its policies, and obtained new ideas for cancer control.

Our data for research and evaluation, as well as for statistical enumeration, are obtained from the death records, hospital records, clinic records, questionnaires to physicians, records of contacts with individuals concerned in the educational program, followup records, and personal interviews in house-to-house surveys. This material is transferred to punchcards, tabulated, and analyzed.

The findings of several studies conducted by this division, which were either original contributions or a confirmation of the work of other statisticians, demonstrate the scope and type of statistical activities in the program.

It was found that the logarithm of the adjusted cancer death rate increased with the logarithm of the density of the population up to densities of about 4,000 persons per square mile and from there on remained practically constant (2).

Later, the reason for this relationship to density was found to be the high cancer death rate of the foreign-born and their children, both of whom have more cancer than native-born with native grandparents. This was particularly marked for cancer of the stomach.

It has been shown that persons with skin can-

cers are predisposed to other cancers of the skin. Males with lip cancers are somewhat predisposed to multiple skin cancers. There is no evidence that skin cancer provides immunity to other primary cancers (3).

There was a definite association between cancer of the buccal cavity and the use of tobacco (4).

Incidence of cancer among the husbands and wives of cancer patients was found to be no greater than for men and women in the general population.

Cancer of the cervix is correlated with marriage before the age of 20, divorce or separation at any time, unrepaired lacerations, last child born to women before age 25, and syphilis (5, 6).

Cancer of the breast shows correlation with trauma, but the relationship may be more apparent than real.

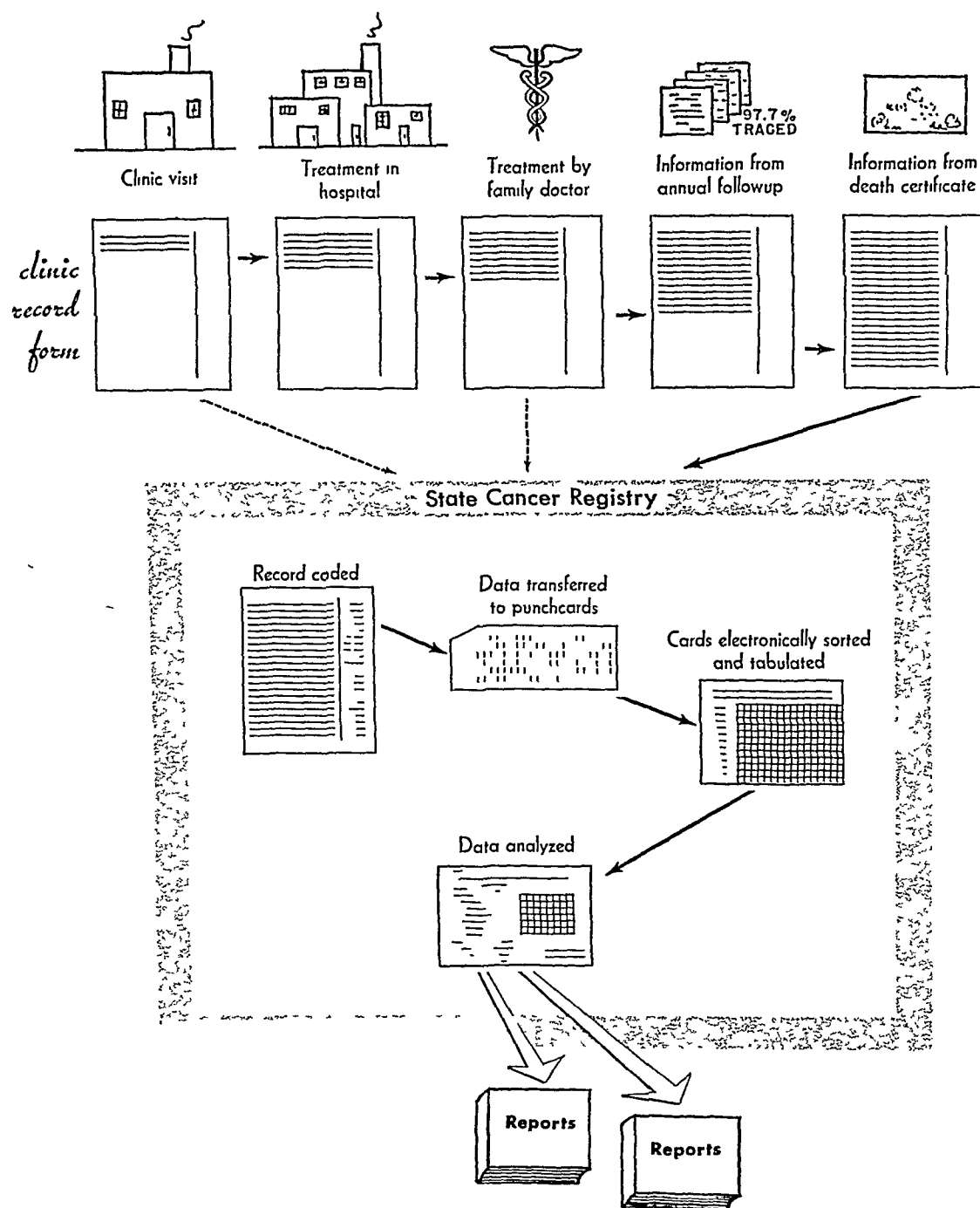
Hospitalization

The Pondville Hospital, with 139 beds, and the Monsignor Roche wing of the Westfield State Sanatorium, with 50 beds, furnish hospital facilities for patients with cancer or suspected cancer of all types and stages who cannot otherwise be adequately cared for, have lived in Massachusetts for 2 out of the preceding 3 years, and are certified for admission by a practicing physician or dentist. Both institutions maintain outpatient clinics.

In Massachusetts less than 5 percent of cancer cases are cared for in the 2 State cancer hospitals. The present thinking envisions more and more service on the local level, not only for patients with operable cancers, but also for those needing palliative care.

While present trends indicate that few State cancer hospitals will be established, and that adequate service for the patient can be maintained through local institutions, one outgrowth of the cancer hospital program in Massachusetts is pertinent. During the 25 years in which Pondville Hospital has operated, 163 physicians have received specialized training in the treatment of malignant neoplasms. All had had residencies in other institutions. At the conclusion of their stay they were not only proficient in the diagnosis and treatment of cancer

Evolution of the Cancer Clinic Record



but most of them were interested in the entire control program. Nearly half of them have opened offices in Massachusetts communities and the remainder in 28 other States and 2 foreign countries. This increase in the number of trained cancer personnel augurs well for better cancer service.

Tumor Diagnosis Service

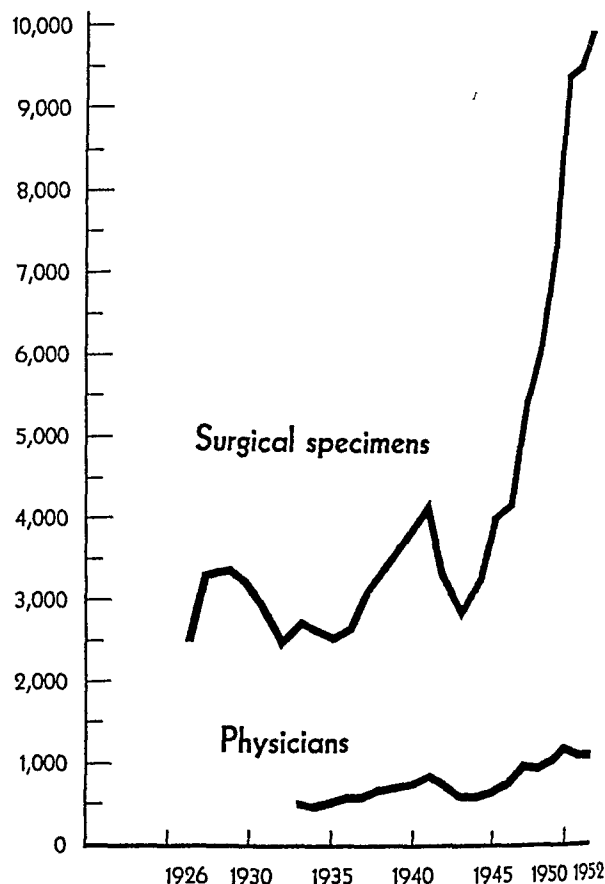
A free tumor diagnosis service is offered by the Massachusetts Department of Public Health in conjunction with the Cancer Commission of Harvard University. The service is purchased from the commission at \$3 per specimen. Any physician or hospital may have suspected tissue examined pathologically. This service is used not only by those surgeons who do not have access to other facilities, but also by pathologists who desire confirmation of their diagnoses.

In the early 1930's approximately 2,500 specimens were examined yearly, and slightly over 500 physicians used the service. By 1940 these numbers had increased to 4,000 and 800, respectively. During the war years use of the service decreased, then increased rapidly, until in 1952 nearly 10,000 specimens were examined and 1,125 physicians used the service (see fig. 1).

Clinics

At the present time, 20 hospitals are maintaining State or State-aided cancer clinics. The 18 State-aided clinics are administered by committees composed of physicians appointed annually either by the local medical society or by the staff of a hospital. The staff serves without compensation and the State purchases certain services for the care of "such persons who may be in whole or in part unable to support or care for themselves" (7). The clinics furnish group diagnosis for any individual in Massachusetts whose physician suspects cancer. Individuals may come directly to the clinics, but it is more satisfactory to have them referred by the family physician, who has a knowledge of the patient's previous condition. Any resident of the State may receive an opinion from a cancer clinic regardless of his financial standing. A standard fee of \$10 is paid by the few who are not medically indigent. Medical social service

Figure 1. Number of surgical specimens examined at the tumor diagnosis laboratory and the number of physicians submitting the specimens, 1926-52.



consultation is available and followup service is maintained for all cancer cases from the first admission until death. Only 2.3 percent of the individuals with cancer have been lost to followup service. Among women with cancer of the genital organs and of the breast, the percentage of lost cases is even less—1.5 and 1.6, respectively.

During the 26 years of operation over a hundred thousand new patients have attended the cancer clinics. About one-third have cancer, the predominating sites of which have been skin, breast, female genitals, and mouth. Only 14 percent of the new cancer cases in the State are examined in the State and the State-aided cancer clinics.

In the first year of the clinics 20 percent of the persons who attended were referred by physicians; by 1950 this percentage had increased to 86 percent. In 1950, nearly 20 percent of

Percentage of persons admitted to cancer clinics who were referred by their family physicians, by years

Year	Percent	Year	Percent
1927.....	20.1	1940.....	80.8
1928.....	29.2	1941.....	81.4
1929.....	34.0	1942.....	84.4
1930.....	35.8	1943.....	84.5
1931.....	37.9	1944.....	83.8
1932.....	42.6	1945.....	84.4
1933.....	45.0	1946.....	84.0
1934.....	47.4	1947.....	82.4
1935.....	58.2	1948.....	83.2
1936.....	67.2	1949.....	84.8
1937.....	74.1	1950.....	86.3
1938.....	78.1	1951.....	84.0
1939.....	79.8		

the persons having cancer came to a clinic within 2 months of the first recognizable symptoms. More than 80 percent of recommendations made at the clinics are now being carried out within 1 month of the clinic admission.

In the cancer clinics the median age of new patients with cancer of all sites except the urinary organs increased from 61.5 in 1930 to 66.0 in 1950. The percentage increase in the median age among women was over twice that among the men.

The clinic attendance greatly exceeds the number of new cases, since each year there are nearly 25,000 return visits of former cancer patients. Studies have shown that the presence of a clinic in a city increases the number of individuals seeking advice for cancer in the physician's private office.

The cost per patient "serviced" by the State-aided clinics at the present time is \$4.30. (Patients "serviced" include those examined at the clinic, cancer patients who returned for check-ups, and former cancer patients visited in the home by a social worker.)

Education

Cancer education of the physicians is accomplished largely through cancer clinics. The State health department issues an abstract bulletin four times a year which is sent to all physicians who request it. In 1940, and again in 1950 the department purchased and presented to every registered Massachusetts phy-

sician a 300-page book, "Cancer, a Manual for Practitioners," published by a local committee of the American Cancer Society.

In 1932, one of the most far-reaching events in medical education in the whole cancer clinic program occurred—the establishment of the first of the cured-cancer clinics. Patients who had been treated for cancer and had been free of disease for 5 years or longer agreed to be present at a clinic at which their case histories were reviewed. The diagnosis of each individual included as a "5-year cure" was verified by a reexamination of the original slide by three pathologists. Practically every site of cancer was represented and more than 150 5-year cured cases were shown.

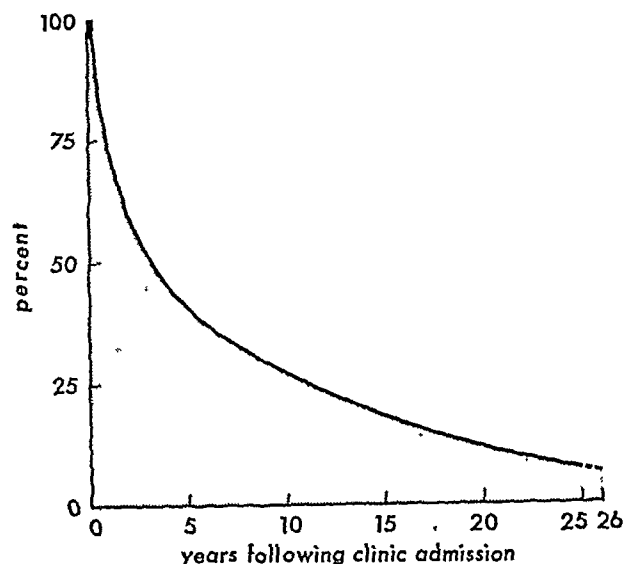
The percentage of surviving clinic patients who had cancer during the first 25 years of the program is shown in figure 2.

This cured-cancer clinic was followed by teaching clinics, which have enabled the general practitioner to see many more cases of cancer than he would have seen otherwise. Men experienced in cancer diagnosis and treatment, from Boston, New York, and other cities, have conducted these clinics, and the general medical practitioner has been invited to attend the clinic nearest his home. Many physicians who have found it difficult to spend 1 or 2 days in Boston can easily arrange to spend 2 or 3 hours at the local clinic. Between 1933 and the present time, 490 teaching clinics have been held with an attendance of 12,661 physicians.

A cancer institute for nurses is held twice yearly. This institute consists of a concentrated 2-week period of instruction and observation at Pondville Hospital, the State-aided cancer clinics, and various institutions. The course includes discussion of the various sites of cancer from the surgical, pathological, radiological, and nursing points of view, and seminars on the public health aspects of cancer control. The number of nurses attending the institute is limited in order that each nurse may be given individual attention.

Other methods of cancer education have included instruction of medical students, lectures to professional groups, such as nurses, doctors, and public health workers, the distribution of literature and posters, radio broadcasts, and instruction in the schools. The Massachusetts

Figure 2. Survival of clinic patients with cancer during 25 years of Massachusetts program.



Department of Public Health also has published several pamphlets of interest to both the medical profession and the laity.

Between 1935 and 1948 the health department carried on a program of cancer education for the laity through the organization of a cooperative cancer control committee in every city and town in the State. These committees were composed of representatives from all organizations in each community and were formed for the purpose of stimulating each organization to devote one meeting a year to a talk on cancer by a local physician. In 1948, the American Cancer Society assumed the greater part of cancer education of the laity.

Since 1948, the State health department has limited its efforts in lay education to the continuation of evaluative studies of educational methods. A public knowledge survey conducted in Waltham, Mass., in 1949 (8) revealed that nearly three-quarters of the population believed that cancer could be cured. Over four-fifths of the population believed that the disease was not contagious; 81.6 percent knew that surgery, X-ray or radium were accepted treatments for the disease; and 87.5 percent would be willing for the public to know that cancer existed in their families. A little more than half were convinced that the children of cancer patients were in no more danger of developing cancer than the children of noncan-

cer patients. Nearly one-half of the persons in the survey knew none of the seven danger signals of cancer; about one-third knew one of them; and about one-fourth knew two or more. Young adults are better informed concerning cancer than those who are older; individuals in well-to-do circumstances are better informed than the poor, and women have a slightly better knowledge of the disease than men.

Lectures were reported to furnish the most valuable source of information regarding cancer, followed, in the order given, by pamphlets, books, posters, magazine articles, moving pictures, newspapers, personal contact, and the radio.

Problems

In reviewing the accomplishments and the failures during the past 26 years, certain problems relating to knowledge of the disease, attitude of the public, and administration of the program have arisen. At the inception of the program, administrative problems in clinic organization predominated.

The establishment of diagnostic clinics at strategic points throughout the State posed innumerable problems. Some medical societies were reluctant to take the initial step although each had its band of enthusiasts. Many physicians wanted to reserve judgment until the effectiveness of the plan was demonstrated. Others were skeptical and suspicious of this entrance of public health into the realm of cancer. Still others were unaware of the imminence of the program so engrossed were they in their own practices.

The law originally read that these clinics should be established "with or without the consent of the medical profession." This dangerous authority was never invoked, but has been mentioned in the literature on several occasions, the most recent being by Anderson (9, 10, 11). The general practitioner's fear of governmental control of medicine had to be overcome by constantly reiterating that the purpose of the program was to augment the facilities of the individual practitioner, not to supplant them.

In some communities the same group formed the personnel of the clinic throughout the year; in other communities rotating service was used.

Some clinics were maintained in a single hospital; others were divided among several hospitals. In one community a Boston specialist was hired to conduct the clinic each month. In another, each 1 of 7 hospitals wanted a share in the clinic, which met in a rotating service in each hospital. Patients who attended the clinic at one hospital and were advised to return for observation pending diagnosis would wait until the clinic again met at that hospital.

A policy of attempting to convince the medical profession of the value of the program rather than of forcing its acceptance has been followed. In the beginning, group diagnosis was difficult. For example, the dean of medicine in a community was frequently regarded as preeminent, either because of his diagnostic acumen or because of the deference accorded him by younger and less prominent practitioners. Also, after election of new officers in a medical society, sometimes the entire clinic staff was replaced by men who previously had shown no interest in the clinic. These problems have all been overcome gradually.

Many factors regarding malignant disease are a deterrent to program planning, particularly of educational programs. These could be better planned if answers were available to questions such as the following:

In addition to those already known, what occupations or other activities subject the individual to carcinogenic agents?

Is there a constitutional factor in cancer etiology?

Is the constitution of the individual a factor that will influence his response to therapy?

What are the reasons for the relationship between economic status and cancer?

Is the milk factor of importance in human cancer?

Why does early marriage predispose to cancer of the cervix?

What habits of the individual predispose him to cancer?

How much of a factor is heredity in the etiology of human cancer?

What differences in morbidity exist in various geographic areas?

Fear and superstition, as well as ignorance and poverty, have hindered the satisfactory con-

summation of the program. The cancer administrator is constantly beset with lack of qualified personnel; lack of sufficient funds; lack of accurate tests for the early detection of all cancers; lack of sufficient accurate data concerning such factors as incidence of cancer and results of treatment; and lack of general understanding that control requires the combined energies of clinicians, radiologists, pathologists, research workers, and public health personnel. Even though he realizes the temporal limitations of this twofold objective, the administrator visualizes the time when individuals will seek medical attention at the first danger signal, and when the medical profession will be equally alert to furnish the necessary therapy.

Evaluation

The importance of evaluating a cancer control program cannot be overemphasized. Appraisals enable persons in charge of the program to evaluate their efforts. Those portions of the program which do not achieve results commensurate with the time and money expended should be replaced by other types of endeavor. Methods for appraisal cannot be stereotyped and must be altered according to the type of program.

In appraising its program, the Massachusetts Department of Public Health has used as measurements increasing attendance at cancer clinics and hospitals, willingness of the public to listen to cancer lectures, increasing number of magazine articles on cancer, number of individuals willing to work for cancer control, number of other States which have used the Massachusetts program as a pattern, and, probably the most important, the changing death rate. In the early part of the century the age-adjusted cancer death rates for both sexes were rising about 2 percent per year in both the Registration Area of 1900 and in Massachusetts. Shortly before this country entered World War I the increase in cancer death rates among females lessened, somewhat more in Massachusetts than in the Registration Area. Beginning in 1926, the annual percentage increase in the cancer death rate for males was only about one-half that recorded previously, for both Massachusetts and the Registration Area. In the middle

Effect of Public Law 779 On Teaching and Research At Public Health Schools

By W. H. AUFRANC, M.D., and
WILLIAM P. SHEPARD, M.D.

For the majority of persons serving in understaffed health departments and directly concerned with meeting day-to-day public health needs in their communities, the recently published paper (1) on health department manpower shortages was probably far from startling when it revealed that budgeted vacancies amounted to 20 percent for physicians, 9 percent for nurses, and 14 percent for sanitary engineers. But by presenting clearly and concretely the staffing deficiencies in State and local public health departments, a real need has been fulfilled by this study which was sponsored by the Health Resources Advisory Committee of the Office of Defense Mobilization and conducted by the Public Health Service. Now that the nature and scope of the problem have been specifically delineated, the deficits of trained personnel in health departments will receive the attention and interest of many more agencies and individuals at local, State, and national levels.

The reported deficits of physicians and nurses offer an incentive for medical and nursing schools to place more emphasis on public health in their curriculums and in their counseling programs. The same holds true for other categories of personnel.

Partly as a result of the findings in the study

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Public Law 779

Public Law 779, a 1950 amendment to the 1948 Selective Service Act, required registration of all men under 50 years of age in medical, dental, and allied specialist categories, if they were not members of a reserve component of the Armed Forces.

Priority I. Men who pursued their professional education either through occupational deferment or through participation in the specialized training programs of the Army or Navy and had less than 90 days of subsequent military service.

Priority II. Same groups as I, under the same conditions, who had 90 days or more but less than 21 months of subsequent active duty.

Priority III. Men in the specified categories with no active duty since September 16, 1940.

Priority IV. Veterans not covered by priorities I and II.

of manpower in health departments, the Health Resources Advisory Committee surveyed for a second time the faculties of schools of public health to appraise the impacts of Public Law 779 on their teaching and research programs. The information available for 1950-51 and 1952-53 is now being used by the State and local advisory committees to the Selective Service System in determining the essentiality and availability of individual physicians. The data will also serve as a benchmark in staffing and will be useful for mobilization and other planning to meet public health needs.

Findings

For an enrollment of approximately 800 graduate students, the 10 approved schools of public health in the United States reported a faculty of 467 teachers and research workers at the start of the 1952-53 school year. This complement represented a slight reduction from the 488 reported for 1950-51; however, at least a part of the decrease is due to a difference between the 2 years in the definition of faculty members to be included. Some schools, for example, excluded from their 1952-53 reports occasional lecturers who had been included in their 1950-51 reports (table 1).

Table 1. Faculty members at schools of public health, by profession, 1950-51 and 1952-53

Profession	Year of report	
	1950-51	1952-53
Total.....	488	467
Physicians.....	187	179
Dentists.....	2	-----
Veterinarians.....	2	1
Others.....	297	287

To get a more accurate measure of teaching programs in schools of public health than total numbers of faculty members, the Health Resources Advisory Committee in their 1952-53 survey asked the total number of teaching hours for those faculty members with teaching assignments. The reports showed about 84 percent of the faculty members held teaching assignments with some of them devoting as many as 1,000 hours per year. The remaining 15 percent of the faculty members were engaged exclusively in research (table 2).

Since almost all the faculty members with teaching assignments devote a considerable portion of their time to research and community services, the typical teaching schedule of formal classroom time was relatively low. About 46 percent of the faculty members with teaching

Table 2. Total annual classroom teaching hours of faculty members at schools of public health, 1952-53

Annual hours	Total	Physicians	Nurses	Others
Total.....	467	179	22	266
No teaching.....	71	17	1	53
Under 100.....	105	52	2	51
100-199.....	70	30	5	35
200-299.....	42	17	2	23
300-399.....	44	19	5	20
400-499.....	30	17	1	12
500-599.....	10	6	-----	4
600-699.....	17	4	1	12
700-799.....	8	5	-----	3
800-899.....	5	2	-----	3
900-999.....	5	-----	-----	5
1,000 and over.....	41	6	1	34
Unknown.....	19	4	4	11

assignments reported less than 200 annual hours of formal classroom instruction. When all 10 schools are grouped, the total hours of formal classroom instruction on an overall basis amounted to 145,000 hours or about 150 to 200 hours per student a year. The individual schools, however, showed marked variations from this overall average, probably because they differed so much from one another by type of enrollment.

An analysis of the classroom teaching hours by academic title and age revealed that most instruction is provided by faculty members with the academic title of associate or assistant professor and that, in general, younger faculty members carry the heaviest teaching schedules.

The percentage of total classroom teaching time contributed in 1952-53 by faculty members according to academic title is given below:

	Percent time
Professors.....	23.6
Associate and assistant professors.....	42.3
Associates and assistants.....	11.1
Instructors.....	8.7
Visiting lecturers.....	9.0
Others.....	5.3

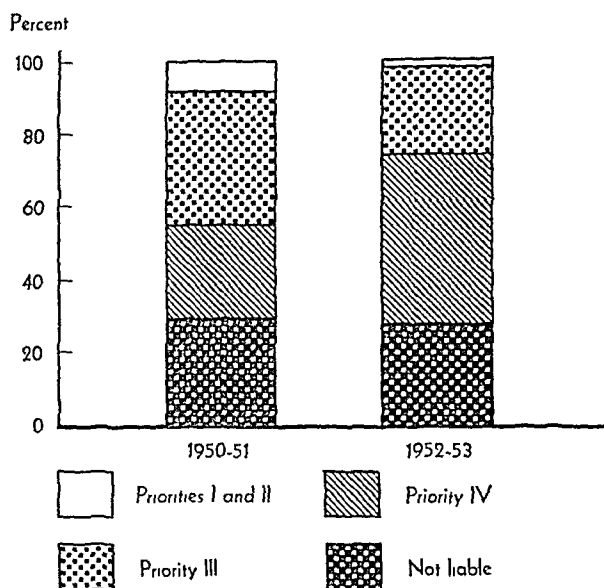
Following are the average annual hours of classroom teaching time contributed by faculty members in each age group:

Age group	Average annual hours
20-29.....	426
30-39.....	379
40-49.....	366
50 plus.....	304

Roughly one-third of the total teaching time in schools of public health during 1952-53 was provided by faculty members in professions covered by Public Law 779. Accordingly, it is especially important for the schools to consider carefully the military liability of these individuals in making faculty appointments. In general, the surveys of the Health Resources Advisory Committee show that they have done this. As a result, they are in a much better position today than they were in 1950-51 (see chart).

As expected, the proportion of men in the first two priorities under Public Law 779 is markedly lower at present than in 1950-51. In

Military liability of faculty members covered by Public Law 779 at schools of public health, 1950-51 and 1952-53



NOTE: Included in the "not liable" group are men over 50 years of age, women, and aliens.

the near future, all men in the first two priorities will have been called for military service, and men with no previous military service, those in priority III, will become liable. On an overall basis, although the picture may be quite different from the viewpoint of the individual schools, the faculty members in priority III contributed 9 percent of the total teaching hours. Men in priority III will be called according to age with the youngest first. It is doubtful if those in the extreme upper-age groups will ever be called at present mobiliza-

tion levels since more and more of the newly graduated physicians are nonveterans and, therefore, will be registered in priority III. The age distribution of the priority III physicians on faculties at schools of public health follows:

Age group	Percent physicians
Under 35	12.5
35-39	20.0
40-44	30.0
45 plus	37.5

Conclusion

The surveys of the Health Resources Advisory Committee show that schools of public health depend on individuals in professions covered by Public Law 779 for more than one-third of their total faculty members. It is, therefore, extremely important for them to follow closely the scheduling of military liability under the law. A comparison of 1950-51 data with 1952-53 information shows that, in general, they have done this. Priority III, the next group in line for military service, at schools of public health contribute roughly 9 percent of the total teaching time. Schools with priority III faculty members in the younger age groups should prepare to obtain replacements now to avoid disruption at a later date.

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Immune Serum Globulin

in the prophylaxis of

paralytic poliomyelitis

measles

infectious hepatitis

hypogammaglobulinemia

The summer of 1953 promises to place a tremendous burden on public health administration and private medical practice in the United States in a basic field—that of control of a communicable disease: poliomyelitis. These months could well represent a historical moment in the many-faceted scientific attack on this intriguing and complex virus disease. And this year may well, also, witness the safeguarding of many children from the paralytic effects of poliomyelitis.

On the following pages are presented several basic source and background documents bearing on the distribution and use of immune serum globulin (gamma globulin) in connection with the prophylaxis of paralytic poliomyelitis and other diseases.

READER'S GUIDE

	Page		Page
The distribution and use of gamma globulin	660	Plan for the allocation of gamma globulin	666
National Research Council		Office of Defense Mobilization	
Gamma globulin	661	Packaging	666
The administration of gamma globulin	661	Allocation for measles and infectious hepatitis	666
Measles	661	Allocation for poliomyelitis	666
Infectious hepatitis	661	Criteria for use	667
Hypogammaglobulinemia	662	Mass community prophylaxis	667
Poliomyelitis	662	Household contacts of clinically diagnosed cases	667
Criteria for diagnosis	662	Other intimate contacts of clinically diagnosed cases	667
Community prophylaxis	662	Household contacts of suspected cases	667
Household contacts of clinically diagnosed cases	663	Distribution within the State or Territory	668
Intimate contacts of clinically diagnosed cases	664	Public education	668
Household contacts of suspected cases	664	Research on poliomyelitis	669
Summary	665	Harry M. Weaver.	

The Distribution and Use of Gamma Globulin

a statement issued April 20, 1953, by the Division of Medical Sciences
of the National Research Council

During the past few months, wide publicity has been given to the results of studies indicating that a fraction of human plasma, known as gamma globulin, has some value as a prophylactic agent for paralytic poliomyelitis. As a result of this publicity, an overwhelming demand for the material may be anticipated in the coming months. The purpose of the present document is to outline the steps that have been taken to meet this situation and to discuss briefly the principles on which current plans for the distribution of gamma globulin have been based.

The supply of gamma globulin is severely limited. It is estimated that the maximum amount available this summer will not exceed 10,000 liters. Even if this were all used for the prophylaxis of poliomyelitis in children, it would provide less than one and a half million average doses. Moreover, the dose would be large enough only to give protection for 4 to 5 weeks. How inadequate is this supply to meet the demand will be evident when it is recalled that there are some 40 million children in the United States of America under 15 years of age.

The situation is even less favorable than these figures indicate. Gamma globulin contributes to the public health in ways other than in the prophylaxis of poliomyelitis. It is well established as a valuable agent in the control of measles and of infectious hepatitis. It is proving its effectiveness in the treatment of the rare condition of hypogammaglobulinemia. Provision must be made to reserve amounts of gamma globulin adequate to meet these needs. Furthermore, since gamma globulin is a product derived from human blood, consideration must be given to the requirements of military

and civilian services for whole blood, plasma and albumin. To maintain a well-balanced National Blood Program, blood collected by the American National Red Cross must be wisely apportioned between these varied needs.

Shortly after the outbreak of the Korean War, it was recognized that the competing demands of several Government agencies for blood and the derivatives of blood might become acute. To assure an equitable distribution, the Office of Defense Mobilization was assigned the task of coordinating the National Blood Program. Late in 1952, the evidence for the value of gamma globulin in the prophylaxis of poliomyelitis was first published. Realizing that this new development would lead to an extreme demand for gamma globulin during the next poliomyelitis season, the Office of Defense Mobilization turned to the National Research Council for advice. In response, the Council appointed a panel of experts in public health services, epidemiology and poliomyelitis to study the problem. There was general agreement that the equitable and effective use of available supplies of gamma globulin could be achieved only by the adoption of a system of controlled distribution. In consultation with the foremost authorities on poliomyelitis, an allocation program was devised and submitted to the Office of Defense Mobilization. The recommendations of the panel were approved in principle by the Health Resources Advisory Committee, Office of Defense Mobilization, on April 15, 1953. The plan, in the form which has been communicated to all health authorities, appears on pages 666-668 of this issue of *Public Health Reports*. The discussion that follows is a brief review of the nature of gamma globulin,

the amounts that are expected to be available this summer and the criteria on which the effective use of the material should be based.

Gamma Globulin

Gamma globulin is the name given to one of several fractions of the protein component of human plasma. It is comparable with the product officially known as immune serum globulin. Gamma globulin is prepared commercially by a method involving a series of precipitations with varying concentrations of alcohol under controlled conditions of acidity and low temperature. An average donation of blood (500 cc.) yields 7 cc. of a 16-percent solution of gamma globulin. This represents a single recommended dose for the prophylaxis of poliomyelitis in a 50-pound (6-7-year-old) child.

The production capacity of existing fractionating plants is limited.

The Administration of Gamma Globulin

Gamma globulin is available as a 16-percent solution. This solution is opalescent and somewhat viscous, necessitating injection through a No. 18 or 20 needle for quantities required for the prophylaxis of poliomyelitis. Injections should be made intramuscularly, using a separate syringe and needle for each subject. Gamma globulin should never be given by the intravenous route.

The use of separate syringes is recommended because of the danger of contamination of the syringe with blood containing the virus of homologous serum hepatitis. This may occur when one attempts to withdraw blood in order to be certain that the needle point is not in a vein. It is for this reason that the repeated use of the same syringe carries the hazard of the transmission of homologous serum jaundice. No instance of hepatitis has been recorded following the use of gamma globulin which has been prepared and administered in the manner described above.

The intramuscular injection of gamma globulin is not accompanied by any significant reactions. The danger of local or systemic reactions must, however, be considered if repeated injections are contemplated.

Measles

A dose of 0.1 cc. per pound body weight, when given soon after exposure, will prevent infection in most cases. When given later in the incubation period, this dose will result in modification of the disease. A dose of 0.02 cc. per pound body weight will usually modify the severity of the attack if given soon after exposure to infection.

In general, modification is to be preferred to prevention. Because of the seriousness of the disease in the younger age group, it is suggested that modification be attempted in all children below the age of 3 years who have been exposed to infection.

Prevention rather than modification may be warranted in hospital situations involving debilitated children and in individual cases where there is concurrent serious disease such as clinically active childhood tuberculosis.

The selection of exposed children rarely presents difficulties since the contact is almost always a frank clinical case and the time of exposure can frequently be determined. A history of a previous attack of measles should suffice to distinguish immune from susceptible children, and thus determine the need for prophylaxis following exposure.

Infectious Hepatitis

Evidence for the effectiveness of gamma globulin in the prophylaxis of epidemic infectious hepatitis is of recent origin. The dose recommended at the present time is 0.02 cc. per pound body weight. There is evidence that lower doses will modify the disease. Further studies are in progress to determine the optimum dose range.

The indications for use are less sharply delineated than they are with measles. Inapparent infections may occur and may contribute to the spread of the disease and to the difficulty in identifying susceptible individuals. Moreover, the infection may be spread by means other than direct contact. In food-borne and water-borne outbreaks, control measures directed at the vehicle of transmission should be imposed and may be supplemented by the prophylactic use of gamma globulin.

Gamma globulin should be most useful in the control of sharp outbreaks in the armed forces and in civilian groups where adequate hygienic measures cannot readily be imposed. In the general population, prophylaxis with gamma globulin among the family and intimate contacts of cases would appear to be desirable. At the same time, hygienic controls and the typhoid-type of isolation of nonicteric as well as jaundiced cases should be instituted.

Hypogammaglobulinemia

This clinical entity has only recently been described (1). It is a rare anomaly characterized by a deficient ability to form antibodies. The essential clinical manifestation is the frequent recurrence of severe infections. Laboratory evidence of the condition may be obtained from electrophoretic analyses of the gamma globulin content of the plasma of the patient and from immunological assays. In this condition, the regular repeated administration of gamma globulin is required to maintain the resistance of the patient to infection. As yet there has been little experience with this treatment and dosages have not been adequately established. The physician must be prepared to adjust the dose to the individual response.

Poliomyelitis

Two reports (2, 3) by Dr. W. McD. Hammon and his associates are available on the epidemiological studies which form the basis for the use of gamma globulin in the prophylaxis of paralytic poliomyelitis. The children investigated ranged in age from 1 to 11 years and the doses used were 4, 7, or 11 cc. depending on the weight of the child. The average dose approximated 0.14 cc. per pound body weight.

Significant protection was demonstrated from the second through the fifth week following injection and diminishing protection was evident from the sixth to the eighth week. There was no significant difference in the number of cases of poliomyelitis in the treated and control groups in the week following injection, but there was evidence of mitigation of paralysis in the cases occurring in the children who had received gamma globulin. This evidence is the

basis for the conclusion that gamma globulin will be most effective if given shortly before or as soon as possible after infection. It is of no value after clinical symptoms of the disease have become apparent (4).

Criteria for Diagnosis

It will be noted that the basis for allocation to the States is dependent upon the reported incidence of the disease, with the suggestion that the incidence of paralytic cases may be used as a control in making additional and supplemental allocations.

To insure uniform reporting it is suggested that physicians and health departments adopt criteria for diagnosis similar to those formulated by the National Conference on Recommended Practices for the Control of Poliomyelitis (5). The following is an excerpt from the above document.

"Diagnostic criteria of paralytic or nonparalytic poliomyelitis should generally include three or more of the following:

- 1) history compatible with poliomyelitis,
- 2) fever,
- 3) stiff neck and/or stiff back,
- 4) 10 to 500 cells per cc. of spinal fluid taken during the acute or early convalescent period of the disease,
- 5) spinal fluid protein elevated above normal limits,
- 6) demonstrable muscle weakness or paralysis.

"Cases which present only (1) history compatible with poliomyelitis, and (2) fever, should be classified as presumptive (abortive) poliomyelitis.

"Paralytic cases are defined as those in which definite weakness or paralysis has been detected and persisted during at least two examinations made at intervals of at least several hours. Results of an examination for paralysis of muscles of the extremities or trunk may be very unreliable during the period of muscle tenderness or 'spasm'."

Community Prophylaxis

Community prophylaxis of age groups at the greatest risk is indicated only in areas in which the incidence is exceptionally high and the onset

of the epidemic is abrupt. In Hammon's studies in Harris County, Texas, where the epidemic rate was 82/100,000, only 0.4 cases were prevented per 1,000 injections. The effectiveness rose to 3.4 per 1,000 in the Iowa study where the epidemic rate was nearly 400/100,000. A further difference between these two epidemics lay in the fact that the former was prolonged over many months whereas the majority of the cases in Iowa occurred in a period of 2 months. The effectiveness of mass prophylaxis is proportional to the incidence of the disease in the selected age group during the few weeks following injection and is influenced by the intensity of the outbreak as distinct from its ultimate rate. Mass prophylaxis is most effective if instituted about 3 weeks prior to the peak of an unusually intense epidemic.

Unfortunately, the prediction of the course and duration of poliomyelitis outbreaks in the population size exposed to the greatest risk is difficult and is subject to large error. It is suggested that an area qualifies for initial consideration for community prophylaxis only if it achieves a rate of 40 per 100,000 within a period of not more than 1 or 2 months and has a sharply rising weekly incidence, calculated by dates of onset at the time the selection is made. Other factors useful in selecting epidemic areas are high paralytic rates with relatively increased percentages of respirator cases and deaths. Urban populations exceeding 100,000 will seldom achieve rates justifying mass prophylaxis and populations of less than 15,000 are unlikely to have enough cases, after recognition of epidemic incidence, to make this type of prophylaxis profitable. Areas most likely to qualify are those with predominantly urban populations of 15,000-100,000. In addition to these, camps, schools, and other captive populations are favorable situations for community prophylaxis.

It should be remembered that only 60-70 percent of the expected cases will be influenced, because the rates among older persons are unlikely to be high enough to justify inclusion of all ages in the treated group. It must also be remembered that, if the recommended dose is used, only a 5- to 8-week segment of the epidemic will be affected. In a few instances, it may be necessary to consider a second injection in the course of an outbreak.

Consideration must also be given to the administrative problems involved in the setting up and staffing of clinics and in the administration of gamma globulin to large numbers of children in a short period of time. The viscosity of the solution and the need for large numbers of 10 cc. and 20 cc. syringes present problems.

It is anticipated that the selection of areas and age groups for community prophylaxis will be made by the State health officer or the State allocation authority. If a request for a special allocation be made to the National Allocation Office, the State health officer will be expected to supply information on the case incidence by week of onset, the number of deaths and of respirator cases, and the ratio of paralytic to total reported cases in the area.

Household Contacts of Clinically Diagnosed Cases

During epidemics, the incidence of secondary cases in families is five to twenty times the rate of poliomyelitis in the general population. That is to say, the members of a family in which a case occurs are subject to a much higher risk than are individuals in the community at large. On the basis of risk alone there would appear to be good reason to give priority to the prophylaxis of family contacts. There are, however, no controlled studies of the effectiveness of gamma globulin in the protection of household contacts of diagnosed cases. There is much evidence to indicate that infection is often widespread in families at the time the first case is recognized. If gamma globulin were effective only when given prior to infection, the case for household prophylaxis would be prejudiced. Hammon's results suggest, however, that inoculation after infection but prior to the onset of symptoms may be expected to modify the disease although it may not prevent it. This view bears significantly on the interpretation of the data in the table in which the incidence and chronological distribution of secondary cases of poliomyelitis in families are summarized.

It will be observed that 60 percent of secondary cases occur within 5 days of the diagnosis of the first case. Even if gamma globulin is

administered promptly to the household contacts, it will not be expected to prevent or modify the severity of disease in these cases. An additional 30 percent of the secondary cases will occur within a few days of inoculation. Hammon's results suggest that this group of cases may be mitigated in severity.

Table 1. Chronological distribution of poliomyelitis cases in families following index case

[A summary of data from several sources (6)]

Days interval between onset of first and subsequent cases	Number of secondary cases	Percent	Possible prophylaxis
0-5-----	242	60. 0	None. Modification. Prophylaxis.
6-12-----	120	29. 6	
13-30-----	42	10. 4	
Total----	404	100. 0	

The final 10 percent of secondary cases will occur in the period in which the protective effect of gamma globulin is maximal and it is this fraction of cases that one may hope to prevent by the use of household prophylaxis. This would, at first sight, appear to be a poor return on the investment were it not a fact that the rates for this small fraction of delayed cases are comparable with the rates among all children in epidemic areas. On this basis, household prophylaxis may be expected to be as effective (cases prevented per 1,000 doses of gamma globulin) as community prophylaxis in the prevention of epidemic poliomyelitis and may be more effective if weight is given to modification as well as prevention of the disease. In areas in which epidemic proportions have not been attained, there will be no justification for general community prophylaxis.

There are a number of administrative advantages associated with household prophylaxis. The population that is to receive gamma globulin is easily defined. Distribution can be carried out through established public health channels and can be made in advance of the poliomyelitis season because allocations do not depend on the precarious prediction of epidemic incidence. Moreover, the cooperation of private physicians is assured since on them will rest

the responsibility for the diagnosis of cases, and the identification and inoculation of contacts.

There is one subjective disadvantage which should not be overlooked. Some 60 percent of secondary family cases will be neither prevented nor modified by the use of gamma globulin. Unless physicians and the public are fully informed of this situation, an unjustifiably critical attitude toward the value of gamma globulin may develop. The public will see the failures of prophylaxis; the successes will be hidden from it.

Intimate Contacts of Clinically Diagnosed Cases

This is simply an extension of household prophylaxis to include individuals who are judged to have been as intimately associated with the diagnosed case as were the members of the household. The extension is logical but raises the difficulty of defining the criteria of intimacy. The method is likely to be most useful in rural and in self-contained suburban communities in which the number of intimate contacts of an individual is limited.

The extension of prophylaxis from household contacts to equally intimate contacts must be used with restraint; otherwise, the allocations to States will be rapidly depleted. It is anticipated that the responsibility for the definition of extra-household contacts and the areas within the State in which this method of prophylaxis may be used to advantage will rest with the State health officer.

Household Contacts of Suspected Cases

The immunization of household contacts of suspected cases may be viewed as a selective form of community prophylaxis which is specifically directed toward those individuals in the community subject to the most intimate exposure to the virus of poliomyelitis at the time that prophylaxis is undertaken. The use of this method is advocated only in intense epidemic situations. It may be particularly valuable in sparsely populated areas in which sporadic cases lead to extremely high rates of incidence but which are not suited to mass prophylaxis.

The method has the merit of giving protection to individuals who may be exposed to infection several days earlier than would be possible were the injections delayed until the phy-

sician could make a more certain diagnosis. There is a further hypothetical advantage which is of quite undetermined value although it may be most significant. Infection with the poliomyelitis virus is much more likely to be abortive than paralytic. It follows that the first invasion of a family by the virus is probably evidenced only by a case of minor illness. Should the case actually be one of poliomyelitis, immunization of the family at this time may prevent any paralytic case from developing.

The prophylaxis of contacts of suspected cases has serious disadvantages. Its efficacy is just as dependent as is that of community prophylaxis on the accurate prediction of epidemic conditions. If it is used in other than epidemic areas, much gamma globulin will be squandered on contacts of minor illnesses, a negligible proportion of which are poliomyelitis infections.

The method has been described as a selective form of community prophylaxis. It differs in that the office of every physician in the area will become a prophylactic clinic. From one point of view, this will simplify administration by avoiding the problems that are associated with the organization of centralized clinics. On the other hand, if a significant fraction of the total population in the area is involved, it may overtax the physicians and result in undesirable delay in completing the required number of injections.

Summary

It is estimated that about 1,000,000 average doses of gamma globulin will be available for the prophylaxis of poliomyelitis during 1953. The selection of the group of individuals in which this limited supply of material can be used most effectively presents many epidemiological and administrative problems. Four alternative methods have been recommended by the division of medical sciences, National Research Council, and have been incorporated in the allocation plan adopted by the Office of Defense Mobilization. The advantages and disadvantages of these methods in particular situations are reviewed. The allocation plan is based on the principle that it is the local health officer who is in the best position to decide which method of prophylaxis will most effectively meet each local situation as it arises.

The household contact plan would appear to be the most effective in areas of low or moderate incidence, with possible extension to include intimate contacts other than family members. With high epidemic incidence in a community with an intense outbreak, either community prophylaxis of age groups particularly susceptible or extension of the household contact plan to include contacts of suspected cases may be suitable. Factors such as community size, expected severity and duration of the epidemic, facilities for the injection of large numbers of individuals and the availability of gamma globulin may influence the decision as to the plan for emphasis in a particular area.

The plans are of sufficient latitude, however, to apply to almost any situation, and appear to offer some hope of restricting the use of the scarce material to the groups at greatest risk.

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- (4) Bahlke, Anne M., and Perkins, J. E.: Gamma globulin for paralytic poliomyelitis. *J. A. M. A.* 129: 1146-1150 (December 22) 1945.
- (5) Recommended practices for the control of poliomyelitis (formulated by The National Conference on Recommended Practices for the Control of Poliomyelitis, held in Ann Arbor, Mich., June 1949). Sponsored by The National Foundation for Infantile Paralysis.
- (6) Data derived from:
 - Swartout, H. O., and Frank, W. P.: Multiple familial cases of poliomyelitis. *J. A. M. A.* 125: 488-490 (June 17) 1944.
 - Unpublished data from Dr. Gaylord Anderson, University of Minnesota School of Public Health, 1946.
 - Unpublished data from Dr. R. F. Korn, New York State Health Department, 1950.
 - Unpublished data from Dr. William McD. Hammon, University of Pittsburgh Graduate School of Public Health, 1951-52.

During a severe epidemic there is a possibility that suspect cases, rather than confirmed cases, would serve as guides to some of the children most likely to have been very recently exposed or currently undergoing exposure. Injection of these children may have a selected advantage since some of these suspect cases will represent true primary infections in families and the whole train of possible subsequent paralytic cases occurring after the span of one incubation period would be prevented. Based on cases prevented to thousands of injections given this method may have some advantage. On this basis, this method can in no way be considered less effective per dose given than injection of all children at one specific time.

Distribution Within the State or Territory

While it is recognized that the exact method of distribution will vary within the States and Territories, it is recommended that:

Private physician should request gamma globulin from the local health department or other health authority.

It is further recommended that in order to

obtain gamma globulin for prophylaxis, physicians should be required to furnish the name and date of onset of the case, as well as the names, ages, and weights of household contacts to be inoculated.

It is also recommended that the basic allocation of 60 cc. per case reported (p. 666, col. 2, l. 12-30) be interpreted to indicate the average amount needed for prophylaxis of household contacts of clinically diagnosed cases. The actual amount distributed to the physician for this purpose will vary depending on the number and ages of the household contacts involved.

Public Education

It is recommended that:

In a coordinated program of public education, the Office of Defense Mobilization make widely known such details of the allocation plan as it may see fit to adopt and implement.

If desired by the Office of Defense Mobilization, the Panel on Allocation of Gamma Globulin shall undertake further consideration of a plan for public education both lay and professional.

Current Readings on Gamma Globulin and Poliomyelitis

Evaluation of Red Cross Gamma Globulin as a Prophylactic Agent for Poliomyelitis. IV. Final Reports of Results Based on Clinical Diagnosis.

By William McD. Hammond, M.D., Dr. P. H.; Lewis L. Coriell, Ph.D., M.D.; Paul F. Wehrle, M.D.; and Joseph Stokes, Jr., M.D.

In *Journal of the American Medical Association*, volume 151, pp. 1272-1285, April 11, 1953.

Gamma Globulin—What Is It? What Does It Do?

By Sam T. Gibson, M.D.

In *The American Journal of Nursing*, volume 53, pp. 700-703, June 1953.

Four Phases of the Polio Problem:

1. Michael Reese Hospital's Over-all Plan.

By Morris H. Kreeger, M.D.

2. Medical Management of Bulbar Cases.

By James A. Downing, M.D.

3. The Nurse's First Job; Establish Confidence.

By Jacquelyn Cook.

4. Make Room for Physical Therapy.

By Lorette Sullivan.

In *The Modern Hospital*, volume 80, pp. 90-106, June 1953.

Hospital Service During a Poliomyelitis Epidemic.

By Genevieve M. Fahey, R.N.

In *Hospitals*, volume 27, pp. 60-61, May 1953.

Methods of Predicting Total Cases of Poliomyelitis During Epidemic Periods.

By F. M. Hemphill, Ph.D., F.A.P.H.A.

In *American Journal of Public Health and the Nation's Health*, volume 42, pp. 947-955, August 1952.

Progress in Research on Poliomyelitis

By HARRY M. WEAVER

RESEARCH is primarily and essentially a journey into the unknown, for the principal purpose of solving problems that disturb us, and for which we have no satisfactory solution. Prerequisite to the solving of any problem is the exploration, study, and understanding of all those areas of knowledge that are related directly or indirectly to the problem which has been posed. Without the benefit of the perspective that comes with such knowledge, one encounters the grave risk of deciding, prematurely, that a problem has been solved, only to learn to his sorrow, at some future date, that all of the relevant facts were not at hand.

Although great forward strides have been made in the general field of the medical sciences, far more remains to be learned than is known today. I am inclined, therefore, to be somewhat hesitant in drawing sweeping conclusions relating to poliomyelitis, because, it seems to me, the many voids in our knowledge of the medical

The "journey into the unknown" of poliomyelitis is traced from before 1938 to the present—and projected into the future—by one who has been along much of the journey.

sciences leave us without the depth of perspective we should have.

Limitations and Scope

It is impossible for any one individual totally to comprehend the program of research against poliomyelitis. Seldom has there been assembled such an array of talent, representing so many diverse fields of scientific specialization, all working toward a single common objective. The intensity with which the individual members of this coordinated team carry out their work results in an ever growing and ever changing body of knowledge about poliomyelitis. No sooner does one investigator tentatively suggest a concept to explain some unresolved problem, than we find one or more other workers subjecting that concept to the acid test of quantitative experimentation. This constantly changing body of knowledge causes no little confusion in the minds of those persons who attempt to keep abreast of this progress. But, because this program of research is dynamic, our knowledge about poliomyelitis is approaching with unusual directness and rapidity the objective for which we all strive, i. e., the absolute and total truth.

Because of the fact that we are conducting research on so many different aspects of poliomyelitis—the virus, its host, the acute disease, its after-effects, methods of prevention and of treatment—it is difficult for any one individual to stay abreast of even the basic principles, and it is impossible for him to comprehend totally

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This informal review of research, here somewhat condensed, was presented at a special meeting of the Board of Trustees of the Foundation in New York City on January 26, 1953. In his talk, Dr. Weaver pointed to limitations of time and space, remarking his "regret that it has been necessary to omit many very interesting and several potentially important observations."

the inferences and subtleties of this rapidly changing body of knowledge.

Finally, because poliomyelitis so frequently results in crippling, because this disease selectively affects most commonly the healthy child in the very bloom of his youth, because poliomyelitis is prone to strike with such dramatic suddenness, we are understandably anxious to rid ourselves of the dread that this affliction will strike down one of those dear to our own hearts. It is only natural, therefore, that into any report on research we try to read a new cure, a new preventive, or, at least, a new means of ameliorating the crippling after-effects of this affliction.

A Review of Progress

My intention is not to state or imply that the means are now at hand whereby we can protect ourselves from the paralytic consequences of an infection with the virus of poliomyelitis, but rather to review, within the limitations to which I have already referred, the very considerable progress that has been and is being made in an effort to provide some practical means to control this disease. We may examine the results of research in the field of poliomyelitis in relation to four different periods of time: (a) prior to 1938, (b) from 1938 through 1947, (c) from 1948 through 1952, and (d) the years that lie ahead.

As we discuss the research of prior years, we should not lose sight of the fact that in all fields of human activities—and the medical sciences are no exception—hindsight, as compared with foresight, is very much more penetrating, illuminating, and satisfying. In assessing the work of prior years, we have available a vast body of scientific knowledge that simply did not exist when that research was being conducted. And may I be the first to point out that the body of scientific knowledge, to which I have just referred, is not by any stretch of the imagination of the making of the National Foundation for Infantile Paralysis and its grantees alone. We have unhesitatingly applied to our work in poliomyelitis, where applicable, knowledge that has emerged through no effort of ours, but because some individual or group supported an investigation on some

problem which seemed totally unrelated to poliomyelitis. We are fortunate that a sharing of knowledge is the accepted way of research. Indeed, it is not unlikely that when the work of the National Foundation has been completed, history may record the fact that its greatest contribution was not the bringing forth of some practical means to control poliomyelitis, but that it stimulated and supported a cooperative effort of many scientists, from which effort emerged the knowledge requisite to fashioning the answer to one of man's even more distressing problems.

The Years Before 1938

The National Foundation for Infantile Paralysis was created in 1938 for the purpose of initiating and supporting a comprehensive effort by scientists to develop some practical means whereby man could protect himself from the paralytic consequences of an infection with the virus of poliomyelitis. That was, and continues to be, the principal objective of this organization.

It is very difficult to describe accurately our knowledge of poliomyelitis as it existed in 1938. Research on any subject progresses in an orderly fashion through several sequential stages, of which the principal ones are: (a) the construction, on purely theoretical grounds, of a concept to explain one or more aspects of the problem; (b) the modification of the concept in accordance with what are believed to be all of the facts relating to the problem; and (c) the evaluation of the concept by controlled and critical experimentation.

Facts and Misconceptions

The scientific literature, prior to 1938, contains many statements about poliomyelitis that have subsequently been proven to be true. This literature also contains a vast array of misconceptions. It is not too unfair to say that, for the most part, knowledge about poliomyelitis in 1938 was so limited in extent, and so lacking in experimental proof, that it was difficult for the investigator of that day to distinguish between fiction, wishful thinking, and fact.

In 1938, the science of virology was in its swaddling clothes. Only a handful of workers

were qualified by training and experience to conduct critical investigations in this field. The tools required to carry out scientific research on poliomyelitis were, for the most part, crude prototypes of those available today; and even they were in such short supply, and so expensive, that it was a fortunate worker indeed who had an opportunity to work with them. Furthermore, most work on poliomyelitis required use of monkeys, with the result that research was even further limited to those very few individuals who could obtain financial support in large amounts. In an attempt to continue work without adequate means of support, it appeared necessary to carry out with one or two monkeys experiments that should never have been attempted without utilizing scores of these animals. The result was a long period of confusion with respect to the immunology and other aspects of poliomyelitis.

Foundation Stones

However, the work on this disease prior to 1938 was by no means all bad, as may have unintentionally been implied. It is a matter of record that there were laid the foundation stones of the program of research that exists today. The significant contributions of that period include: (a) a reasonably comprehensive description of the clinical disease; (b) proof that this disease is caused by a virus; (c) finding of an animal host, the monkey, suitable for experimental studies with the virus; (d) the demonstration that the crippling after-effects of poliomyelitis occur only as an aftermath of damage or destruction of nerve cells by the virus; and (e) suggestive evidence that the virus may be transmitted from person to person without the assistance of an extrahuman vector.

The more serious of the misconceptions that we inherited, and with which we subsequently had to deal, included the belief that (a) the disease is caused by only one type of virus; (b) the virus is capable of reproducing itself only within nerve cells; and (c) the virus enters the body through the nose, and subsequently travels through the body exclusively within nerve fibers. These particular misconceptions are referred to because they tended to fix the direction of research.

The Period 1938-47

The results of research from 1938 through 1947 are difficult to describe. One of the more important accomplishments of the period was the training of additional workers and the organization of properly equipped laboratories so that a truly comprehensive and effective program of research against poliomyelitis could be instituted.

In that era we began to find out exactly what happened in the body following an infection with the virus of poliomyelitis. We learned that when disease did occur following exposure to the virus, the manifestations of disease might extend from a slight and transient fever on the one hand, to paralysis and death on the other. We learned, also, that an individual could become infected without exhibiting the slightest evidence of disease. We learned, in fact, that a "silent infection" with the virus is the rule, and that paralysis is the rare exception.

We discovered also that the digestive tract of man constitutes both the portal of entry and the portal of exit of the virus. Moreover, human beings constitute the principal reservoir of the virus in nature. We learned also that the order of frequency with which individuals may be found to be excreting the virus may be listed as: (a) the individual with acute poliomyelitis, (b) household associates of the case, and (c) close, personal, extrahousehold associates of the family. We determined also, as one would logically expect, that the virus could be recovered in nature from those species of flies that feed and breed on human excreta. Admittedly, we were disappointed to learn that fly abatement programs did not modify epidemics of this disease.

During that same period of time, we learned that in relatively unsanitary parts of the world where it is rather easy to isolate regularly the virus in close proximity to human beings, paralytic poliomyelitis occurs much less frequently, usually in children under 5 years, and almost never in epidemic form. Comparing such regions with other parts of the world where modern sanitation is the rule, and where one seldom isolates the virus in nature except during the time of an epidemic, we find that the paralytic disease is more common, the disease is more

likely to afflict older persons, and epidemics are the rule rather than the exception. Thus, we have the paradox of more paralytic disease in those parts of the world where there is less virus, and a lesser incidence where virus is more regularly found.

A closer scrutiny of this seeming paradox revealed the interesting fact that individuals living in those unsanitary—but nevertheless relatively poliomyelitis-free—parts of the world almost invariably had poliomyelitis antibodies in their blood. Furthermore, they acquired these antibodies at a far earlier age than in other parts of the world. The finding that a mixture of antibody and virus was incapable of causing disease suggested that antibodies might play a useful role in the body's defense against paralytic poliomyelitis. However, an attempt to utilize this observation to fashion a useful agent against paralytic poliomyelitis had to await the next era of research.

Advances in Treatment

The period 1938 through 1947 was also one in which great strides were made in developing more effective treatments for individuals afflicted with the disease. While it is true that no existing form of treatment has been shown to be capable of limiting the spread of the paralytic process, methods have been devised which, if correctly employed and instituted early enough, are most effective in preventing contractures of muscles. In prior years, it was the progressive contracture of muscles that brought about the horribly misshapen bodies so frequently encountered as a result of poliomyelitis.

This same era witnessed the rapid development of methods of treatment which, although incapable of curing paralysis, enabled the afflicted individual to utilize to the fullest extent possible the motor nerve cells which had escaped destruction by the virus. During that same period we began to develop more effective methods of treatment for those unfortunate individuals suffering from respiratory paralysis.

Influences on Severity

It was during this era that we learned for the first time that certain factors influence the severity of the paralytic consequences of poliomyelitis. For example, it was discovered that

paralysis is more extensive and severe in those afflicted individuals who continued exhaustive physical activity during the febrile state of the disease, and that an individual is especially prone to develop the bulbar form of the disease if he contracts poliomyelitis within 30 days after removal of his tonsils and adenoids. Unquestionably a few individuals escaped the more serious consequences of poliomyelitis by taking cognizance of these observations; but the number of individuals spared must have been pitifully small. It was also observed that the incidence of paralysis is increased during pregnancy.

Paradoxical as it may seem, we also learned much when it seemed that we were learning little. We tried to circumvent many of the difficulties inherent in poliomyelitis research by attempting to unlock the secrets of poliomyelitis through work with other viruses for which simple laboratory methods were available. Although we learned a great deal about subjects other than poliomyelitis, it soon developed that the indirect approach left much to be desired. As we view that period in retrospect, it becomes painfully evident that we compounded, all too frequently, the most glaring error of the previous era—that of conducting research with inadequate numbers of animals. Again it had to be learned that conclusions drawn from improperly conceived and inadequately controlled experiments, far from contributing to progress, are apt to so confuse the issue that a practical solution to the primary problem may become buried under a mound of misinformation.

Lessons of a Decade

Thus ended another era, comprising 10 years of work. More investigators had been trained, laboratories had been organized and equipped, many experiments had been performed—experiments which had yielded a very considerable body of knowledge; but, we had failed to enunciate, on even the most tentative basis, any method for control of paralytic poliomyelitis that was worthy of critical trial.

As that period drew to a close, it became evident that, if real progress were to be made, more exact methods of research would have to be instituted, objectives would have to be clearly defined, procedures and techniques would have

to be developed to permit attaining these objectives, and individual groups of workers would have to concentrate their energies on one, or at most a very few, of the objectives.

The 1948-52 Era

During the period 1948 through 1952, the National Foundation for Infantile Paralysis instituted a policy of holding frequent informal conferences with small groups of its grantees. These "off the record" conferences provided an opportunity to critically evaluate, on a continuing basis, the status of the various research problems relating to poliomyelitis. It was in these meetings that the deficiencies in our program of research became obvious. It was here that objectives were defined, experiments designed, and workers found who were eager to devote their undivided attention, if need be, to carry out the experiments required to attain the objectives set by the group.

Reliance on group thinking to guide research can be, from an administrative point of view, a disappointing experience. However, if those concerned are principally motivated to achieve success in the total program; if the individual contributors are allowed the right to range without penalty along lines that may be ahead or even contrary to the thinking of the group; and if the conferences can be conducted in a spirit totally divorced from any employer-employee relationship—under these conditions, the effectiveness of group thinking is a stimulating experience to behold.

Credit for much of the progress in this period should be given to the many individuals who, without personal recognition, so generously contributed their thinking and suggestions to other investigators. The ingenuity, the quality, and the decisiveness of many of the recent reports on poliomyelitis reflect the effectiveness of this coordinated thinking and planning.

One of the first recommendations to come out of these conferences was that exact methods of research must be the rule. This meant fewer experiments per year, though at a vastly increased cost per experiment.

So that adequate numbers of monkeys would be available for such experimentation, and to assure delivery of uniform animals to each of

the various laboratories so that the work of one could be compared with that of any other, the National Foundation established a monkey conditioning center. This center provided housing for 3,000 animals, and the supply and distribution system allowed for delivery to grantees of more than 20,000 fully conditioned monkeys annually. Without this operation many of the studies that have brought us to the point we have reached today could not have been carried out.

Determination of Virus Types

At the beginning of this era of research, we had good reason to suspect that human poliomyelitis might be caused by more than one type of this virus. Of all the problems we have undertaken to solve, none has been of greater fundamental importance than the establishment of this fact. Any hope of controlling poliomyelitis with preventive or curative drugs, preventive serums, or with vaccines; any hope of learning how the disease is transmitted from individual to individual through population groups; any hope of developing a satisfactory explanation for the fact that this disease does not affect all persons to the same extent and degree—a solution for these, and for other important problems as well—demanded that we first determine exactly how many different viruses are capable of causing human poliomyelitis. And, should more than one type of the virus be found to exist, we knew that we would then have to determine the distribution of each in nature, the capabilities of each to induce disease in the human being, and the capacities of each to induce immunity to whatever number of other types might be found.

The solution of this problem necessitated the monotonous repetition of exactly the same technical procedures on virus after virus, 7 days a week, 52 weeks a year, for 3 solid years. The number of monkeys utilized in this effort is legion. The physical effort expended by the investigators to cope with the struggles, the dodges, and the antics of this horde of primates, is almost beyond comprehension.

But, in spite of these and other difficulties, this problem has been solved. At a cost of more than \$1,370,000, we have learned that there are three different types of the virus circulating

throughout all parts of the world, each capable of causing paralytic poliomyelitis in the human being. We learned also that development of immunity to any one of the virus types did not convey similar immunity to either of the two remaining types. It was also observed that within each of these types, individual strains of the virus were encountered which appeared to be less virulent than other members of the same type.

These findings stand as one of the most important milestones in research against poliomyelitis.

The Role of Antibodies

Once we knew how many different viruses one had to protect against, it was possible to return to an observation that had been made prior to the era we are now discussing: The discovery that poliomyelitis antibodies are present at an early age in the blood of individuals who live in those parts of the world where paralytic poliomyelitis is seldom encountered. Such antibodies are found also in the blood of most adults, irrespective of where they might reside. These antibodies appear also in the blood of monkeys following recovery from an attack of poliomyelitis or subsequent to vaccination against the disease. There are, of course, three different poliomyelitis antibodies—one for each of the three different types of the virus.

Since these antibodies are found only in the blood of animals or human beings who seldom if ever become afflicted with the disease, and since such antibodies are capable of inactivating virus, it seemed to be of paramount importance to determine whether these antibodies are an essential link in the mechanism for protection against paralysis, or whether they represent some nonuseful byproduct of the process of infection.

There followed a number of animal experiments from which one could safely draw the conclusion that, if poliomyelitis antibodies are present in the blood in sufficient amount prior to an infection with the virus, the incidence of paralysis is materially reduced, and, under certain circumstances, may be entirely prevented. But this was the result in the laboratory, where it is possible to select the route of inoculation of the virus, and the amount and kind of both

antibody and virus that are injected. Furthermore it is possible in the laboratory to administer these substances separately in accordance with a time schedule most favorable for the result desired. The next and obvious question was: Are these antibodies capable of protecting against the paralytic consequences of a natural infection with the virus in human beings?

Immune Serum Globulin

Fortunately, other workers had already succeeded in their efforts to develop methods to permit extracting, in concentrated form, these antibodies which are present in the blood of most adults. This product was already in commercial production, under the name of "immune serum globulin," ordinarily referred to as gamma globulin, and had already been shown to be effective against two other viral diseases, measles and infectious hepatitis. Through the courtesy of the American National Red Cross, a very considerable quantity of this valuable material was made available.

As soon as this material could be made ready for use in the field, a Foundation grantee undertook to determine the capacity of this substance to prevent paralytic poliomyelitis in human beings. The plan for this investigation exemplifies what can be accomplished through group thinking, and its execution is a fitting tribute to those who worked so hard and skillfully toward so important an objective.

Results of Field Trials

This experiment yielded two important results: (a) An agent which, if it could be made available in sufficient quantity, man could employ to protect himself against the paralytic consequences of a natural infection with the virus; and (b) a vastly more important result—the knowledge that this protection could be attributed to poliomyelitis antibodies circulating in the blood in relatively small amounts.

The field trials demonstrated quite conclusively that an injection of a sufficient quantity of this substance will confer some protection against the paralytic disease. However, the duration of effectiveness, in the dosages employed, was limited to about 6 weeks; and during the first week of this period, paralysis would appear to be lessened in severity, rather than

prevented, although the number of cases developing paralytic poliomyelitis within 1 week of an injection of gamma globulin was too small to determine for certain whether or not paralysis was ameliorated.

To further complicate this situation, immune serum globulin is obtained from the blood of human beings, and has heretofore been manufactured in rather small amounts. Because of limited manufacturing facilities and supplies of human blood, we cannot hope for the production of more than a very small fraction of the amount of this material that will be sought by the American public. A central allocation authority has been established to provide for the distribution of all of this material. This will provide a mechanism to insure, insofar as it is possible to do so, the most efficient use of this scarce product.

We are fully cognizant of the fact that immune serum globulin is not a practical answer for poliomyelitis. We knew, before the field trials were ever conducted, that when poliomyelitis antibodies are injected into the body, they disappear within a relatively short period of time. If, on the other hand, the body is induced to manufacture its own antibodies, as it does following an infection with the virus, such antibodies remain in the blood for long periods of time, perhaps for many years. The principal reasons for doing the field trials were: (a) to determine whether or not naturally occurring paralytic poliomyelitis is preventable by poliomyelitis antibodies; and (b) if so, what are the minimal amounts of these antibodies that must be circulating in the blood at the time of an infection with the virus. The results of the field trials support the concept that paralytic poliomyelitis could be prevented by vaccination, if the vaccine could induce the body to produce each of the three different poliomyelitis antibodies in sufficient amounts.

Significance of Tissue Culture

But, in spite of the progress so far described, I would be very skeptical of our achieving any practical method for control of poliomyelitis within the foreseeable future were it not for yet another important discovery. This was the development of methods whereby all three types of the virus of poliomyelitis may be grown on

small bits of human or animal tissues which are themselves growing in test tubes.

We have only just begun to realize the real significance of this remarkable discovery—a discovery equally applicable to a host of problems quite remote from poliomyelitis. In previous years, an investigator had no other alternative than to use large numbers of monkeys when he sought to determine whether a given material did or did not contain virus, and, if it did, in what amount and of what kind. Similarly, monkeys had to be employed to determine the amount and kind of antibody that might be present in a given sample of blood. Today, all of these experiments can be done in test tubes, and the results can be ascertained in less than one-fourth as many days as when monkeys were required.

In prior years, we could not undertake, with any reasonable hope of success, studies designed to determine the chemical and physical configuration of the virus particle. We were unable to do this because the virus could neither be obtained in sufficient quantity, nor in a simple enough menstruum, when the only source of virus was from the central nervous system tissues of monkeys. Today there is no practical limit to the amount of virus that can be produced.

Prior to the discovery of methods for growing virus in test tubes, we were without any cheap and effective laboratory procedure to sort out, from among the hundreds of thousands of chemical compounds that exist, those relatively few that might be worthy of critical trial against poliomyelitis in animals. Today, such tests are being performed in test tubes. In years past, we had far less chance than today of developing an effective vaccine. Why? Because we did not have a method that was sufficiently uniform for producing large quantities of virus; and also because viruses obtained from the nerve tissues of monkeys are contaminated with small amounts of other substances which, when injected into the body under certain conditions, are liable to precipitate destruction of the recipients' own brain tissues. It is relatively easy to standardize the growth of viruses in test tubes; and when such viruses are grown on other than nerve tissues, they are apparently free of these harmful substances.

These are not all of the practical applications that have stemmed from the development of methods for growing viruses in test tubes. But this may be enough to show why this discovery alone has, in my opinion, earned the right to be designated the keystone of modern research on poliomyelitis.

We have come to the end of the present era with a sufficient body of knowledge to know with certainty that there can be fashioned, in at least one of two ways, a practical method for control of human paralytic poliomyelitis. The first of these two methods is through use of drugs; the second is by vaccination.

Drug Potentialities

There are several reasons why the first of these objectives might be a less desirable method of control. For example, drugs are usually not effective for long periods of time and, except in the face of an epidemic, it would be difficult to insure widespread use of preventive drugs on a continuing basis. Further, if there is developed a method for control of poliomyelitis with drugs capable of arresting the spread of the disease process, one would then have to recognize that in most cases the virus would have already wrought some damage before it could be brought under the influence of the drug.

Until this past year, our attempts to find an effective drug were somewhat discouraging, because we had not developed adequate experimental methods to select chemical compounds worthy of clinical trial. Now, however, the technical difficulties have in part, at least, been overcome, with the result that we are in a much more favorable position to detect reasonably effective compounds, if such compounds exist, or if they can be made.

Vaccination Outlook

However, it would appear that the most likely way to develop an effective and practical method for control of human paralytic poliomyelitis would be through vaccination. With this method of control we would not have to await an outbreak of the disease, as we would if electing to control poliomyelitis through preventive or curative drugs. On the contrary, vaccination could be carried out prior to the expected appearance of the disease, with a much greater

chance, therefore, of providing protection for all.

There are many different methods by which an effective vaccine might be prepared. The scientific literature shows that with serial passage of the virus through an unnatural host, the virus tends gradually to lose its capacity to invade nerve tissues and destroy nerve cells, without losing its capacity to stimulate production of protective antibodies. It now appears that one of the best procedures for producing this effect is that of growing the virus in test tube cultures of living tissues. From the theoretical point of view, vaccines prepared in this way should be the most effective of all. However, it is impossible to predict from animal experiments whether or not such preparations would be safe to use in human beings. Much laboratory work remains to be done before such vaccines can safely be administered to man. In a similar stage of development is another possible method of vaccination, in which living virus of all three types is administered following an injection of immune serum globulin. While these and other possible methods of vaccination are far from being ready for field trial, we may be assured that research will reflect increasing attention to these possibilities.

Finally, studies in both experimental animals and human beings have demonstrated that prior treatment of the virus with certain chemicals may so change the virus particle that it is incapable of damaging nerve cells but still able to induce formation of antibodies. Admittedly, a vaccine prepared in this way would have lost some of the capacity of untreated virus to elicit antibody formation. Fortunately, there is good reason to believe that the disadvantages resulting from chemical treatment of the virus can be largely overcome by administering the vaccine in conjunction with certain potentiating oils.

Maturation of Research

As we examine the research that was conducted from 1948 through 1952, it becomes evident, that during this era, research on poliomyelitis attained sufficient stature to stand on its own two feet. Only a few short years ago, much of our work was done with other viruses in the rather desperate hope that in this way we would learn something about poliomyelitis for

which we did not have techniques to permit of effective study. Following full documentation of the work that has already taken place, it would not be to surprising to find other workers in the years to come using the virus of poliomyelitis in the hope that they may learn something about other pathogenic agents.

Research of the Future

In light of recent progress, some may hope for a positive statement as to whether or not a practical method for control of human paralytic poliomyelitis is "just around the corner." Inasmuch as research is truly an exploration into the unknown in an attempt to solve a problem for which there is no presently available solution—one must reply that if we knew exactly when and by what means we could provide the solution for a particular problem, there would be no need to conduct research. As we understand the problem of poliomyelitis today, it would be unrealistic to think that a practical method for control awaits the discovery and application of some undiscovered fundamental principle or even a new technique. It would seem that we are now in possession of the scientific principles and tools required. But, although hope in the hearts of men will undoubtedly continue to spring eternal, and such hope with respect to poliomyelitis is not without some very considerable basis in fact, no one can safely predict when that longed-for day will come. The only truthful answer is this: A practical method for control of paralytic poliomyelitis will never be forthcoming unless research is continued.

It is in this present era that we have reason

to expect many important forward steps will be taken. In some instances this may mean moving from work on animals to studies with human beings. Such transitions necessarily entail some calculated risk. Often it is quite impossible to determine, in advance of doing such studies, the degree of risk involved. Those who propose such steps should not be surprised if more voices are raised in opposition than in support. The investigator will be hard-pressed to distinguish between risks of reasonable probability on the one hand and risks of unlikely possibility on the other; and he must recognize that among the outcries may be those motivated by fear or due to an incomplete understanding of the problem or to an incomplete appreciation of the social responsibility of science. Perhaps the scientist contemplating such steps can gain some comfort from the provocative observation of Raymond Fosdick that "what is wrong with the world of today is not the dreams of the idealists, but the cynicism of those who call themselves realists."

Summary

It is apparent that there has been tremendous progress in the fight against poliomyelitis, and that we are now in possession of many of the tools and basic facts with which will ultimately be fashioned a practical method for control of this affliction. It is impossible to say when this objective can be achieved, since much hard and exacting work still remains to be done. But with greater knowledge for more intelligent planning and with sharper tools for more precise experimentation, the attainment of our goal seems to be moving ever closer.



The WHO Tuberculosis Research Office

—A Review of the First Four Years—

By I-CHIN YUAN, M.D., Sc.D., and CARROLL E. PALMER, M.D., Ph.D.

AFTER the second World War, mass BCG vaccination programs were started in several countries of Europe as an emergency measure to combat tuberculosis. The work of tuberculin testing and vaccinating was conducted under the auspices of the International Tuberculosis Campaign (ITC), an organization established by three Scandinavian voluntary organizations (the Danish Red Cross, Norwegian Relief for Europe, and the Swedish Red Cross), and joined in March 1948 by the United Nations International Children's Emergency Fund (UNICEF). Through such united effort and support, the campaign was extended to millions of persons in many parts of the world. And, as this was the first time that BCG vaccination had been done internationally on such a large scale, it was not surprising that problems and questions arose for which there were no answers. The need for systematic and carefully controlled investigations of BCG vaccine and vaccination became increasingly apparent.

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At the invitation of UNICEF and ITC in the fall of 1948, a field survey was made and a report (1) was presented to the Joint Health Policy Committee of UNICEF/WHO on the possibilities for scientific research in connection with the mass BCG vaccination programs. The committee recommended the report to the Director-General of the World Health Organization; and the WHO members of the committee brought it to the attention of their Executive Board. As a result, the World Health Organization established the WHO Tuberculosis Research Office (TRO), in February 1949, in Copenhagen.

Method of Investigation

The work of the WHO Tuberculosis Research Office is essentially one of applying scientific methods to technical field problems connected with the international BCG program or arising from its operations. For this, TRO has assisted and cooperated with many national and international organizations including: the Danish National Health Service, the Danish State Serum Institute, and the Danish National Anti-Tuberculosis Association; the Finnish National Anti-Tuberculosis Association; the Tuberculosis Control Service of the Icelandic Government; the Union Mission Tuberculosis Sanatorium at Madanapalle, India; the international BCG Pilot Station at Paris; the Public Health Service of the United States; the International Tuberculosis Campaign; and the WHO Tuberculosis Section which took over the work of the ITC in July 1952.

To obtain reliable results, great care is taken in the design and the execution of each investigation and in the analysis of the results. This requires appropriate statistical concepts and methods; a trained technical staff to assure uniform techniques and accurate and unbiased observations; study groups of sufficient numbers and comparable controls; and, above all, critical judgment in drawing conclusions. Such requirements are, of course, essential for scientific work, but their value cannot be overemphasized in clinical and public health research. Unfortunately, in some countries, the use of controls as a legitimate method of research in studying the treatment and prevention of disease in man is not generally accepted, either by society or by the medical profession. Any attempts of this kind are often opposed as "experimenting" on human beings. Laboratory studies on animals are fundamental to the understanding of disease processes in man. Clinical control studies, however, are essential if progress is to be made in solving many of the problems of man's health and man's diseases.

New Research Laboratory

With the current extension of the WHO/UNICEF BCG program to many countries where BCG has been little used and where reliable information on the nature and prevalence of tuberculous infection and disease is lacking, the need for scientific inquiry becomes even more apparent. TRO's experiences have repeatedly shown that what is found to be true in one area frequently fails to hold as true for another area where people live under different environmental, economic, and social conditions. If serious mistakes are to be avoided in the conduct of large-scale BCG campaigns, preliminary surveys and BCG studies should be made by competent pilot teams to determine suitable techniques and criteria for vaccination and the type of results to be expected.

The Tuberculosis Research Office has hitherto put great emphasis on human field studies, although the need for basic laboratory research has been recognized for some time. A generous offer by the Danish National Health Service from their UNAC (United Nations Appeal for Children) funds together with yearly contribu-

tions from the Tuberculosis Research Office made it possible in 1952 to create an international laboratory, the Tuberculosis Immunization Research Center, where a closely coordinated program is now operating to study the complex problem of tuberculosis immunity through integration of results from both the laboratory and the field. The laboratory was established within the premises of the Danish State Serum Institute in Copenhagen by agreement between the World Health Organization and the Danish Government.

Research Program

When the mass BCG campaign was started, the technique of tuberculin testing and vaccinating was formulated largely on the basis of experience in the Scandinavian countries, although it was recognized that changes might have to be made as the work was extended into different parts of the world. This proved to be so. Tuberculin testing procedures were repeatedly modified, and critical problems were encountered when the vaccination results were found to differ widely from what was expected. The research program developed by the Tuberculosis Research Office, therefore, involved a variety of short-term and long-range investigations which comprised almost the whole subject of BCG vaccine and vaccination from the tuberculin test to the efficacy of mass BCG vaccination in the prevention of tuberculosis. (See the outline of TRO activities, p. 680.) Its object was to place tuberculosis immunization on a rational and scientific foundation.

One of the first responsibilities that TRO agreed to undertake was to direct the collection of BCG campaign statistics and to analyze and prepare the material for publication. At the conclusion of the International Tuberculosis Campaign in June 1952, a total of 38 million children had been tuberculin-tested, and 18 million of the total had been vaccinated with BCG in 23 countries. This was the first time that mass immunization of such magnitude had been conducted on an international scale. The opportunity it offered for collection of information on tuberculin sensitivity was without precedent. The technique for the tuberculin test

Objectives	Operations	Results
TRO STATISTICAL DOCUMENTATION OF MASS BCG CAMPAIGNS		
To assist the International Tuberculosis Campaign in organizing field statistical work and training of local statistical personnel.	Before January 1952—statistics from 23 countries in Europe, North Africa, the Middle East, Asia, and Latin America.	Annual and monthly statistical summaries for International Tuberculosis Campaign.
To compile statistics and prepare reports on tuberculin testing, vaccination, and postvaccination testing of national campaigns.	At present—statistics from Aden Colony, Iran, Pakistan, India, Burma, Thailand, Formosa, Hong Kong, the Philippines, Malaya, Costa Rica, El Salvador, Jamaica, and Trinidad.	Individual reports documenting completed campaigns in 12 countries.
To handle WHO/UNICEF campaign statistics after conclusion of International Tuberculosis Campaign in June 1952.		Reports for Lebanon and for Palestine refugees included in ITC second annual report (3). Simplified procedures introduced for collection of field statistics.

EVALUATION STUDIES OF BCG VACCINATION IN TUBERCULOSIS PREVENTION

Danish Mass Tuberculosis Campaign

To develop national roster of the tuberculin-tested, X-rayed, and vaccinated for long-range followup of tuberculosis morbidity.	Joint program with Danish National Health Service and Danish Anti-Tuberculosis Association for countrywide campaign in Denmark (except Copenhagen.)	Punch card records made for 1.2 million persons of whom half vaccinated during campaign or before.
Special studies of relation of allergy and X-ray findings to incidence of tuberculosis.	Campaign started in early 1950 to cover 1.5 million persons aged 1-6 and 15-34 years and to include tuberculin testing, vaccination, and X-ray examination of adults.	Special studies conducted to evaluate and improve methods of tuberculin testing, X-ray examination, and selection of persons for vaccination.
		Improved compulsory national notification of pulmonary tuberculosis.

Finnish Mass BCG Campaign

To study long-range effect of mass vaccination on tuberculosis mortality through national roster of the tested and vaccinated.	Cooperation with Finnish Anti-Tuberculosis Association and Finnish National Office of Vital Statistics in operating a statistical office in Helsinki and analysis of tuberculosis mortality statistics.	Work on roster begun September 1949; copying of some 1 million cards for population 1-25 years.
		Punch cards completed for 850,000 tested and vaccinated.
		Matching of tuberculosis death certificates against roster now progressing.
		Steps under way to verify tuberculosis deaths for acute forms of the disease.

was relatively uniform. Usually the test was made with a standard tuberculin produced by a single laboratory. In many countries, only a single low-dose test was used. Record forms were also standardized.

Statistical Documentation

Almost all the data sent to Copenhagen have now been published in 14 reports documenting the campaigns by individual country (2, 3).

WHO Tuberculosis Research Office (TRO), Outline of Activities, 1949-53—Continued

Objectives	Operations	Results
BCG VACCINE AND VACCINATION STUDIES		
To investigate basic factors influencing allergenic potency of BCG vaccine with particular reference to problems arising in international BCG campaigns.	Studies chiefly in Denmark; also in Mexico, southern India, and Egypt under joint auspices of International Tuberculosis Campaign, Danish State Serum Institute, and TRO.	Approximately 23,000 school children vaccinated in 27 projects. Retesting after 6-12 weeks completed in all 27 projects.
To study dosage and age of vaccine, exposure to light and heat, qualitative differences between living and dead bacilli, vaccination techniques, and so forth.	Program of testing, vaccination, and periodic retesting of school children supplemented by laboratory work at Danish State Serum Institute on vaccines used.	1-year retesting completed in 20 projects. 2-year retesting completed in 8 projects.
To compare vaccines prepared by different laboratories.	Close cooperation with national and local health services and officials, BCG production laboratories, and BCG Pilot Station in Paris.	Work in Denmark to continue on reduced scale. Work in other countries being extended.

LABORATORY INVESTIGATION

To undertake laboratory research on tuberculosis immunity and immunization with particular reference to BCG.	International Tuberculosis Immunization Research Center established within premises of Danish State Serum Institute (Copenhagen). Supervision and coordination by joint committee of 4 (2 each from WHO and Danish Government).	Temporary director of center appointed. Bacteriologist and biochemist appointed. Work begun October 1952 in newly built laboratory.
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These 14 reports describe how the campaign was conducted in each country and what tuberculin test and vaccine were used. They give detailed statistical information about tuberculin sensitivity rates in each district or county within each country. Such information has great epidemiological value for comparing tuberculin sensitivity among countries and among areas within a country. Sensitivity to a low dose of tuberculin is perhaps the best single index of tuberculosis that can be obtained for many countries today where morbidity and mortality statistics are either not available or are unreliable. Some of the reports also contain information on *postvaccination retesting*. During the early ITC campaigns, some retesting was done in various countries, but no conclusions could be drawn because of the variability of the methods. Since the autumn of 1950, however, specially trained teams have

been sent to Ecuador, Egypt, Greece, India, and Syria to make systematic surveys of postvaccination tuberculin allergy. Analysis of the results revealed significant geographic differences, posing further problems for research.

Because tuberculosis is still the leading cause of death in almost all the Asian, East Mediterranean, and Latin American countries, a cooperative field research station has been set up in Madanapalle, India, with the assistance of the Indian Government, to study the epidemiology of tuberculosis in a rural population. The work is geographically limited in scope, but it is expected that the results will increase our understanding of the nature, prevalence, and spread of tuberculosis in a tropical region and the effect of BCG vaccination on the course and frequency of the disease. Similar epidemiological studies are also in progress in Iceland (4) where the insular position of the

Objectives	Operations	Results
EPIDEMIOLOGICAL STUDIES OF TUBERCULOSIS IN TWO DIFFERENT COMMUNITIES Madanapalle		
To investigate prevalence, nature, and spread of tuberculosis and to investigate certain control methods in this rural Indian community of 52,000 population, including 175 surrounding villages.	Madanapalle Field Station established through cooperation of the Indian Government and the Union Mission Tuberculosis Sanatorium at Madanapalle.	Approximately 42,000 persons tuberculin-tested and X-rayed; 11,000 of these BCG-vaccinated. Retesting and X-ray reexamination of 10,000 persons in 1951-52. 185 patients diagnosed and treated. Basic information transferred to punch cards for annual followup. Analysis under way.
Iceland		
To investigate prevalence, nature, and spread of tuberculosis and to investigate certain control methods in this insular country of 140,000 population.	Project with cooperation of Icelandic Government for countrywide studies. Central office at Reykjavik.	National roster to include information on tuberculin sensitivity and X-ray findings for the population by household groupings. Plans for followup of tuberculosis morbidity and mortality. Detailed records for many years being transferred to punch cards.

country and the efficient health services favor long-range followup. BCG has been used sparingly in Iceland.

Other long-range projects were designed to study the changes of tuberculosis morbidity and mortality in relation to mass BCG vaccination campaigns in Denmark (5) and Finland (6). National rosters of the tested and vaccinated have been set up in Denmark to permit direct matching of current morbidity reports and in Finland for matching of death reports. Tuberculosis morbidity or mortality of the vaccinated may thus be compared with that of the non-vaccinated (natural reactors to tuberculin) and with the expected trends in the general population.

Vaccination Studies

Early in the ITC campaign, in the summer of 1948, unusually low tuberculin conversion

rates were reported from one country (Poland). It was thought that possibly the potency of the vaccine had been reduced by failure to keep it cold, but several other possibilities were also considered, and it soon became clear that many questions about BCG simply could not be answered at that time. By taking advantage of the national BCG vaccination program of school children in Denmark, arrangements were made for tuberculin testing, vaccination, and followup to be conducted by special TRO research teams so as to provide answers to some of those questions. Emphasis was first placed on the effects of various physical factors, particularly temperature and duration of storage. More questions arose as the studies progressed and were extended to other countries. To date, 27 separate field research projects have been completed in which approximately 44,000 school children have been tuberculin-tested, and more

WHO Tuberculosis Research Office (TRO), Outline of Activities, 1949-53—Continued

Objectives	Operations	Results
STUDIES OF THE TUBERCULIN TEST AND TUBERCULINS		
<p>To study specificity of the tuberculin test with particular reference to selection of noninfected persons for vaccination in different parts of the world.</p> <p>To investigate causes of low-grade reactions observed in tropical and subtropical countries.</p> <p>To develop suitable methods for field standardization and comparisons of tuberculins.</p>	<p>Work conducted by special TRO-directed teams cooperating with national and local health authorities in Denmark, Egypt, Finland, Holland, Iceland, India, Mexico, Norway, Pakistan, and the United States of America.</p>	<p>In addition to the 23,000 children tested in the BCG vaccine studies, approximately 93,000 children and adults and 4,100 tuberculous patients tested with standard PPD, many with duplicate tests using varying doses and different antigens.</p> <p>Need for further investigations of significance of different kinds of tuberculin sensitivity clearly indicated.</p>

CONSULTATION AND TRAINING

<p>To advise on technical matters of mass BCG vaccination previously conducted by the International Tuberculosis Campaign and now by WHO/UNICEF.</p> <p>To assist WHO Tuberculosis Section and regional offices in training selected physicians, nurses, and statisticians for BCG work.</p> <p>To acquaint health officers and WHO fellows from various countries with TRO work and methods of investigation.</p>	<p>Training by senior staff members of TRO.</p> <p>Includes statistical evaluation projects, field vaccine studies, and co-operative research program connected with Danish tuberculosis campaign.</p>	<p>Increasing number of international and national officials visit WHO Tuberculosis Research Office for conferences and discussions on technical problems of BCG vaccination.</p> <p>Requests for training of BCG personnel increasing.</p> <p>During 1952, 36 health officers from 23 countries and 15 WHO staff members and fellows have spent from 1 day to 2-3 months in TRO.</p>
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than 23,000 nonreactors among the 44,000 children have been vaccinated and retested at regular intervals.

The results of some of these studies have been reported in separate papers (7, 8). All have recently been drawn together and published in the form of a monograph (9). The results have proved different in many respects from what has been generally accepted. For example, it was believed that the vaccine had to be kept cold and used within a short time after preparation, that large numbers of living organisms were needed to obtain a satisfactory allergic response, and that the potency of a vaccine could be adjusted simply by minor changes in the amount of BCG per unit volume.

None of these has been confirmed. Instead, it has been shown that the vaccine can be kept for 10 weeks at 2-4° C. without significant loss of its allergenic potency; and storage at 20° C. for a month or 37° C. for 5 days causes only a slight reduction in the level of tuberculin allergic response. Vaccine could be diluted tenfold or given in twice the usual dose without causing a significant change in allergy.

On the other hand, the depth of injection of vaccine was found to have considerable practical consequence. Although the level of allergy is not affected, the size of the local lesions at the vaccination site as well as the frequency of abscesses increases with deeper injections. Differences in depth of injection may therefore

explain why a greater proportion of complications was found in some of the campaign areas than in others, even though the same vaccine was used in all of them.

Exposure to Light

Although it has been common knowledge that many biological products are harmed by light and undue exposure should be avoided, the practical significance of the effect of light on BCG vaccine was not recognized until the poor results found in Egypt and other southern countries by the retesting teams prompted the search for some powerfully destructive agent. Exposure of the vaccine to sunlight was naturally suspected and a series of experiments was planned and carried out. The results showed that light has a devastating effect on the vaccine. After 30 minutes' exposure to direct sunlight, the postvaccination Mantoux reactions decreased in mean size from 20.5 mm. to 8.6 mm.; the vaccination lesions decreased in mean size from 9.0 mm. to 5.5 mm.; and the colony count of BCG organisms was reduced approximately a thousandfold. A substantial decrease in colony count was seen after exposure of the vaccine to the sun for only 5 minutes. Subsequent laboratory studies in the Danish State Serum Institute at Copenhagen have shown that exposure to ordinary daylight through the double glass laboratory windows during the preparation of vaccine also can cause a large reduction in the number of viable organisms. One of the results of the field and laboratory research is that the laboratory procedures have now been modified to avoid light exposure during the preparation and handling of the vaccine and, at the same time, WHO/UNICEF vaccination teams have been advised to take similar precautions in the field.

Degree of Sensitivity

Differences have been observed among vaccines produced by different laboratories. Some workers claim that these are due to variations between strains of BCG. Field studies, on the other hand, have shown that varying proportions of living and dead organisms may account for a great deal of the observed differences. Vaccine composed entirely of dead (heat- or light-killed) organisms produces a low level of

allergy, but mixtures with living organisms can produce almost any level of allergy, depending on the relative proportion of each component. Moreover, there appears to be some kind of interaction between living and dead BCG: The addition of only a small fraction of living organisms to killed vaccine produces stronger allergy than would be expected from the sum of the two acting independently.

Throughout the research program, tuberculin sensitivity—the kind induced by BCG as well as the naturally occurring kind found in unvaccinated persons—is shown to be quantitative (10-14). It is appropriately described in terms of degree rather than as simply being present or absent, positive or negative. After vaccination, for example, the sizes of the tuberculin reactions of a group are generally found to be fairly closely concentrated. Some reactions are smaller than the average, and some are larger, yet the population as a whole responds to vaccination with much the same degree of tuberculin sensitivity. The degree of sensitivity, in turn, depends on the particular batch or strength of vaccine used. Some vaccines induce tuberculin sensitivity as high as that found from natural infection, and the same high degree of BCG-induced sensitivity is still present after 2 years. With other vaccines the group response is of a low degree. Irrespective of the degree of sensitivity, however, the average size of the postvaccination reactions is shown to be a simple, useful way to describe results for a group of persons given the same vaccine or to compare results with different vaccines. The more familiar method of noting the percentage of positive reactions gives far less information and may even obscure large differences in the degree of sensitivity induced by different vaccines.

Tuberculin tests on some 44,000 school children in Denmark, Egypt, India, and Mexico to select those eligible for vaccination show that there are at least two kinds of naturally acquired sensitivity (15). One kind, strong reactions to a weak dose of tuberculin, is found everywhere. This is designated as high-grade or specific sensitivity, and it undoubtedly results from infection with virulent tubercle bacilli. Its frequency generally corresponds with the prevalence of tuberculosis. The other

kind, called low-grade or nonspecific sensitivity, is distinguished by small reactions to a weak dose of tuberculin and fairly large reactions to a strong dose. Found only in some countries, or in some areas within a country, it has no relation to the prevalence of tuberculosis (16, 17). The existence of nonspecific sensitivity, even though its cause is still unknown, necessarily has a direct bearing on the validity of tuberculosis infection rates based on the combined frequency of weak- and strong-dose tuberculin reactors in some parts of the world. It also raises practical problems in how to select persons for vaccination and how to evaluate the results of mass vaccination programs.

Future Tuberculosis Research

The work of the Tuberculosis Research Office has perhaps brought forth more questions than it has answered. It may be appropriate, therefore, to examine broadly the direction of future research to serve best the needs of international tuberculosis control programs.

Since Koch's discovery of the tubercle bacillus in 1882, repeated attempts have been made to vaccinate against tuberculosis, but the outcome of most efforts has been disappointing. The protective value of BCG in man is still a highly controversial subject. The great difficulty is that, with a few exceptions, a comparable control group of unvaccinated persons has not been used to measure the effect of BCG in the vaccinated. More control studies must be made in places where the prospect of success is good and cooperation is obtainable. In accepting responsibility for mass campaigns, we have an obligation to assess the efficacy of BCG vaccination in the control of tuberculosis.

The problem raised by the existence of a non-specific kind of tuberculin sensitivity has far-reaching implications for all forms of tuberculosis control work. The cause of this sensitivity must be sought out and identified. At the present time, the evidence points to an infection with some sort of nonpathogenic agent or agents, possibly an acid-fast organism, which is highly prevalent in some geographic areas. Intensive research is now under way to approach the problem from different sides. Meantime, it is important that the pattern of tuber-

culin sensitivity be carefully studied in different parts of the world to determine where nonspecific sensitivity exists so that suitable steps can be taken to avoid overestimating tuberculosis infection rates, to modify criteria used in selecting persons for vaccination, and to evaluate postvaccination allergy more realistically.

Other Areas for Research

For practical BCG work, it is of great importance to know whether or not vaccinated individuals showing a high degree of tuberculin allergy are better protected, as some believe, than those with a low degree of allergy. This is a serious question in view of the fact that re-testing surveys have revealed unusually low levels of allergy among the vaccinated populations in a number of countries. The same finding may obtain in other countries where no systematic retesting has been made or where BCG programs are being, or will be, conducted. Should individuals with allergy below a certain level be revaccinated? At the present time we do not know. The relationship between allergy and immunity is still obscure; in fact, we still know very little about immunity in tuberculosis. There are many problems to be worked out by combined laboratory and field research.

Finally, a conspicuous opportunity for medical research has arisen in connection with the intensive efforts being made against tuberculosis by international organizations. There are many countries today where tuberculosis is the leading public health problem and where reliable knowledge about the disease is lacking. It is naive to believe that orthodox measures of tuberculosis control, although they may have been effective in western Europe or in North America, are necessarily applicable in countries where conditions of life are different.

The only rational approach, perhaps also a more economical one in the end, is to combine technical assistance programs in such countries with a simultaneous program of scientific research. Undoubtedly, the same can be said about other phases of international public health work. What is practicable in one country may fail in another unless a sound basis for application has been found or the results of preliminary studies support its use. And as

international organizations are increasingly concerned with technical assistance to underdeveloped countries, the complementary role of scientific research must not be minimized.

NOTE. A selected bibliography of WHO Tuberculosis Research Office publications and other reports related to international tuberculosis research may be obtained from the authors. Copies are also available at the Tuberculosis Research Office, World Health Organization, Scherfigsvej 8, Copenhagen, Denmark.

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"New occasions teach new duties"

Using a quotation from James Russell Lowell's *The Present Crisis* as his theme and title, a Harvard professor of public health practice examines pertinent changes in social and health affairs. He assesses the effects of these trends on public health as a specialty of preventive medicine.

By HUGH R. LEAVELL, M.D., Dr.P.H.

TODAY we are all shaken by a rapid succession of changes which threaten to rip us loose from the very roots of our past. These roots are so comfortable and reassuring that we tend to overlook Marcus Aurelius' advice in his *Meditations* to "observe always that everything is the result of a change, and get used to thinking that there is nothing Nature loves so well as to change existing forms." It is not too difficult for us to accept the idea that our business in public health is to get others to change their behavior to make for healthier living. But when we ourselves are called upon to change, the idea is less acceptable.

Two major types of changes with which public health must deal are going on in the modern world: "public" changes and "health" changes. Our professional training helps us most with the health changes. Our knowledge of biology, chemistry, and physics and their medical sub-

specialties helps us find and use the proper immunizing agents to prevent disease, the right kinds of food to eat, the best sprays to kill mosquitoes, and so on. We can usually adjust rather readily to rapid changes demanded as a result of research which provides better tools with which to combat health problems.

The public changes that are so important in public health work are in many respects more difficult for us to appreciate. Most of us have limited backgrounds in the basic social sciences—sociology, anthropology, psychology, economics, and political science—that might help us understand better the people with whom we must work. Yet public changes are often of even greater importance than health changes. For example, resistance to adoption of practices proven desirable by health research may completely nullify the usefulness of the research. This is illustrated by the situation in an Indian jute mill where malaria seriously hampered production. Although the mill operators provided antimalarial drugs without charge, only 15 percent of the employees took advantage of the opportunity to improve their health. Studies are now in progress by social anthropologists and physicians to learn the reasons behind this failure.

More and more we are beginning to recognize the importance of the public changes in our work and are striving to make up for our deficiencies in training in these areas of knowledge. We still have a long way to go. We also have prejudices to overcome, which tend to make us place higher values on the results of

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health research than on those of social research. This appraisal may have been justifiable in the past, but it is likely to be increasingly less so in the future. Social science is finding the scientific method quite as useful as natural science has found it.

Health Changes

We still need to remind ourselves constantly that the increase of man's life span by 18 years in half a century has more profound medical, economic, and social implications than such developments as atomic energy, air transportation, and modern communication. Increased life expectancy at birth is giving this country a population with an increasing proportion of aged persons and is causing us to retool from programs for controlling communicable disease to plans for dealing with degenerative disease and long-term illness.

As health changes have developed, it has become possible for the preventive medicine attack to shift successively from emphasis on the environment, in the sanitation phase, to emphasis on the agents of disease, in the bacteriological phase, to emphasis on the human host, in our present stage of development.

We are also changing some of our concepts about certain diseases, and we are finding that communicable disease control and sanitation may not have entirely unmixed blessings. Ultramodern sanitation, for example, may increase susceptibility to poliomyelitis. Studies in certain African areas have indicated that a high percentage of the local population is immune to poliomyelitis, and that clinical cases of poliomyelitis are extremely rare. Presumably the people there are more or less immunizing themselves by drinking diluted sewage containing polio virus. Prevention of German measles in girls may lead to their later developing the disease as pregnant women and giving birth to children with congenital deformities. As antibiotics control bacterial diseases and more and more new viruses are found, one begins to wonder whether the viruses simply take over when the bacteria are brought under control. As more lives among prematurely born infants are saved and retrolental fibroplasia increases among those saved, one again begins to wonder

a bit. Puerto Rico offers another illustration of how progress may create new problems. Following the introduction of sanitation and communicable disease control measures, the population in this island increased so rapidly as to introduce malnutrition.

These illustrations suggest that unilateral public health must give way to a multilateral approach. We must think seriously and consistently of calling in those who should be our teammates working in agriculture, industry, and education to produce better balance in program and result.

Five Levels of Prevention

Greater knowledge of the natural history of disease opens up new possibilities for a unified attack by all members of the health team. Natural history in this sense is "the process of departure from health, beginning with the very first forces that inaugurate it in the environment or elsewhere, through the resulting changes that take place in man, and until equilibrium is reached or defect, disability, or death ensues" (1). Increasing knowledge of this natural history makes it possible to attack the environment, the agent, or the host at strategic points. Thus, prevention in the broad sense of the word may be achieved at five possible levels: (a) health promotion, (b) specific protection, (c) early recognition and prompt treatment, (d) disability limitation, and (e) rehabilitation, listed in the order in which they become applicable in the stages of the disease process.

Health promotion is directed not at a particular disease or disorder but toward furthering general health and well-being. Attention to nutrition during periods of growth and development and physiologic changes, encouragement of optimal personality development, application of genetic knowledge, health counseling of various types, and health education are examples of activities at this level of prevention. Involving much more than what health workers can do unaided, health promotion includes activities of educators, agricultural specialists, economists, and industrialists.

Specific protection intercepts the causes of disorder before they involve man. Activities at this level, which include immunization

against communicable disease, prevention of dental caries, and control of insect disease vectors, have long been characteristic of health departments and certain voluntary health agencies.

Early recognition and prompt treatment is effective in preventing the spread of disease to others if the disease is a communicable one; in curing or arresting the disease process if specific treatment is available; in preventing complications or sequelae; and in shortening the period of disability. Case finding in the early stages is the foundation at this level.

Disability limitation involves preventing or delaying the consequences of clinically advanced or noncurable disease. As our knowledge of natural history of various disease processes increases, we may anticipate less and less activity at this level of prevention, though there will obviously always be need for it in truly degenerative diseases. This and the preceding level of prevention are those at which work of private practitioners and hospitals has been largely concentrated in the past.

Rehabilitation is concerned with preventing complete disability and economic dependence. It may begin while the disease process continues; it becomes the major method of attack when the disease is stationary. Only recently have we begun to develop activities at this level of prevention, though in some other countries rehabilitation is in a relatively advanced stage of development.

If we keep in mind the natural history of disease and these five levels of prevention, it is apparent that there are opportunities in preventive medicine for all those in the health field, whether they be in health departments or other health agencies, private practice, or hospitals, and for workers in education, agriculture, and industry as well. Each has a part to play; each can contribute to the total attack against disease and toward the promotion of health.

Viewed in this light, public health as organized community action is a part of preventive medicine. The public health agency may be either voluntary or governmental. Private practice also plays a very important part in preventive medicine, and as preventive medicine concentrates more and more upon the host, the

opportunities for private practitioners to practice broad preventive medicine increase. In the future, health departments and other health agencies will likely contribute more and more to private practitioners' work with individual patients and their families. Thus continuity of care by a single practitioner may be more possible than it has been in the past. The attitudes of people are usually favorable to those who help them in illness, and there may well be a carryover value when preventive services are tendered, making these services more acceptable.

Hospitals in the future will have a broadened concept of their place in the community, and their activities will be at all five levels of prevention. Rather than concentrating principally on early diagnosis, prompt treatment, and disability limitation, they may be expected to give increased attention to rehabilitation. As more patients are treated "vertically" rather than "horizontally," health promotion and specific protection also will be employed more widely by hospitals.

Increased knowledge of health problems has necessitated specialization. There is simply too much to know for a single individual to be an expert in all fields. Valuable though it is in many respects, this specialization makes it difficult for the layman to find his way about among the numerous specialized practitioners and health agencies.

Public Changes

The rapid changes in social organization have necessitated such rapid adjustments as to impose severe strains on our adaptive mechanisms. A good deal of evidence indicates that these problems of adaptation have contributed materially to the increased incidence of psychosomatic disorders and mental ill health generally. The troubled political situation of the world today casts its shadow over us all. Industrialization with its mass production favors urbanization. Mechanization, even on the farm, has greatly changed living conditions. The increased leisure time now available to most of the population has created new wants as yet only poorly met. Improved living standards and full employment have lessened the old insecurities of laboring groups.

Large-scale organizations, both governmental and private, tend to create a sense of powerlessness in the individual. The individual, however, needs to participate; his capacity for participation must, therefore, be cultivated to a degree never before necessary.

An unprecedented geographic and social mobility tends to break down the ties of neighborhoods and fixed communities as well as ties with family beyond the immediate husband-wife-child complex. Children are no longer regarded as producers, but as consumers. In the small family each member tends to cherish more fully the others. There is opportunity not only for optimal physical and mental development, but knowledge of the means towards maximum personality realization is becoming more widespread. Parenthood is getting to be a profession; the child is seen more and more as a product of his home and his environment.

Equality between the sexes is being approached and many fields of endeavor are now open to women. One result of this change is that the nursing profession no longer can count upon a vast supply of recruits. Other pursuits, more remunerative and less exacting, have first call.

Social attitudes are changing, and more emphasis is being placed on the dignity and worth of the individual. This has led to diminishing discrimination and the broad acceptance of social security as a right. The period of *laissez-faire* economy has passed, and varying degrees of governmental control have been imposed with varying degrees of acceptance. The leveling of incomes after taxes has greatly reduced individual large-scale philanthropy, with profound effects upon voluntary agencies.

Technical Assistance Programs

With all these changes, positive and negative in effect, economic development has proceeded at virtually a geometric rate in the United States so that this country is pulling further and further ahead of its nearest rivals. To assist in holding the free world together, an international program of technical assistance has been developed to help people in underdeveloped areas help themselves. We are finding that to

do this effectively we cannot impose American ways on these people but must understand the people, their culture, and their problems.

Even in transferring strictly technical health knowledge and practices and in using modern health supplies and equipment, we must understand the basic scientific principles involved so that modification can be made to meet local needs. We must discover what are the frills and what are the essentials. Then the essentials must be made available with a minimum amount of cultural shock to the people who want help. The privy, essentially a hole in the ground, is an example. It is unimportant for its public health purpose whether the privy has a seat or whether the squatting position is used in defecation. Yet many a privy has gone unused simply because the American "sitting" model was imposed on people without taking time to discover their "squatting" habits.

The help we give does not fill a vacuum: It must replace something that is already there. As an illustration, two articles on health appeared recently on a single page of the *New York Times*. One related to a group of scientists, among them several Nobel prize winners, who were setting off to Asia to spread modern health knowledge. The other, taking up twice as much space, described the important place which witch doctors still play in Madagascar. These Nobel prize winners must compete with such witch doctors before they may have their own wares accepted.

In these technical assistance programs it is particularly necessary to develop teamwork between health workers and those who work in agriculture, industry, and education. Public health can be an admirable spearhead for this team since it has acceptable ends to offer, shows tangible results, and can, through training local people, make them relatively self-sufficient.

Public Changes in Health Fields

In considering the effects of social changes in the health fields, we are beginning to see integration and coordination as answers to the problems of specialization and the need for unity of health services. Medical prepayment plans reduce the need for charity, and, if they are comprehensive, promote early diagnosis. Group

practice provides the ultimate skills of medicine in one place. Health centers enable health departments and voluntary health and welfare agencies to join in providing broad services to a neighborhood. Hospital and health department combinations make for economy and efficiency. Extension of hospital services to include home care reduces heavy hospital expenses and supplements the resources of the home. All of these services tied together in regional organizations promote smooth and economical functioning. Many different types of specialists are beginning to work together as teammates, and auxiliary workers are being recruited for less skilled jobs.

Overall health planning is receiving increased interest as manifested by the rapid growth of health councils, many of them linked with community councils in recognition of the interdependence of health and welfare services.

Through broad health education the public has new attitudes about disease. Scientific research has blossomed into a major industry, and the public is beginning to feel that research can solve all problems. Nutrition is recognized as valuable, and alcoholism is coming to be considered a disease rather than a social stigma.

As has happened in nearly all fields of science, social scientists are finding that as they become more experimental, their theoretical assumptions require rethinking. They are finding in the health field a wealth of opportunity for profitable investigation, and in many instances they are providing invaluable assistance to health workers. We cannot afford to ignore these important sources of assistance in health work. The all-important family unit, though retaining its primary functions of child-rearing, companionship, and the regulation of sexual conduct, has had split off from it some of its former economic and protective functions. It no longer performs the religious, recreational, and educational tasks that it once did. Many of these are now entrusted, to an increasing extent, to community agencies of one kind or another.

Meaning of Changes to Public Health

What do all of these changes mean to us who work in public health?

They mean that we need a great deal more research to be able to translate the findings of biological investigation into social application. When we meet a health problem, we must recognize that two kinds of diagnosis and treatment are necessary. We must understand and deal with the health problem. We must also understand and treat the social or public part of the situation. Our pharmacopeia in both fields must be strong. It is no longer sufficient to prescribe drugs and neglect the social factors in a given case.

These changes mean that we must enlist the support of new members of the health team. "The health team cannot be a closed circle of in-facing initiates with backs to the outside world; rather, it must be an open circle ready to welcome new workers and able to expand as new areas of useful cooperation are discovered" (2). The place of the public health social worker is becoming obvious, and there are many important functions which the various types of social scientists can perform as health team members.

We ourselves must become real people with well-adjusted lives motivated by high purpose if we are to achieve real success. The joy that comes by doing our jobs will increase as we understand them better. A major part of this understanding will need to come to us through broader knowledge of human relations and through deeper dedication to our work. We must understand our own assignments and those of our teammates as well. Our services must be made available to the family with a minimum of friction and lost motion. Overlapping and duplicating activities can no longer be tolerated. We must seek constantly to develop arrangements which the consumer can readily understand for providing health services. If there are difficulties in administration, they must be concentrated and handled centrally. We should not expect the individual patient to deal with the maze of organizations and services the modern community provides. We must accept the responsibility, as servants of the people, of working out effectively and economically our administrative problems and the problems of agency relationships.

We must do a better job of training health workers to perform their task adequately in

international relations. Our country can no longer maintain its former ostrichlike attitude; we are not self-sufficient. Our ways are not necessarily the best ways for all people. As we work with other peoples, we must adapt ourselves and our technical knowledge to their local systems and needs. We cannot be autocratic about our democracy.

With all the changes that are in the air, we as practitioners of public health have a deep responsibility and an unprecedented opportunity to serve the people. But it is only with broadest wisdom and deepest humility that we

can meet our new challenges successfully. Or in the words of Lowell:

"New occasions teach new duties; Time makes
ancient good uncouth;
They must upward still, and onward, who would
keep abreast of Truth; . . ."

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To the Professional Public Health Worker

You, like the specialist in medical and other fields of science, know how important it is to be informed on current knowledge in your specialty. And, for the most part, you rely on the first-hand availability of the leading journals and periodicals in your specialty.

But as more becomes known of public health practice and research, the more complex this science becomes. There comes too the need to relate the activities of all its component disciplines—the members of the family of public health—one to the other, and each to the whole. And for each specialist there is a need to read regularly the journals devoted to unifying the family of public health. *Public Health Reports* is such a journal.

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A Method of Simplifying Soil Percolation Tests For Septic Tank Systems

By ABRAHAM GELPERIN, M.D., Dr.P.H.,
and WILLARD O. FULLER, B.B.A.

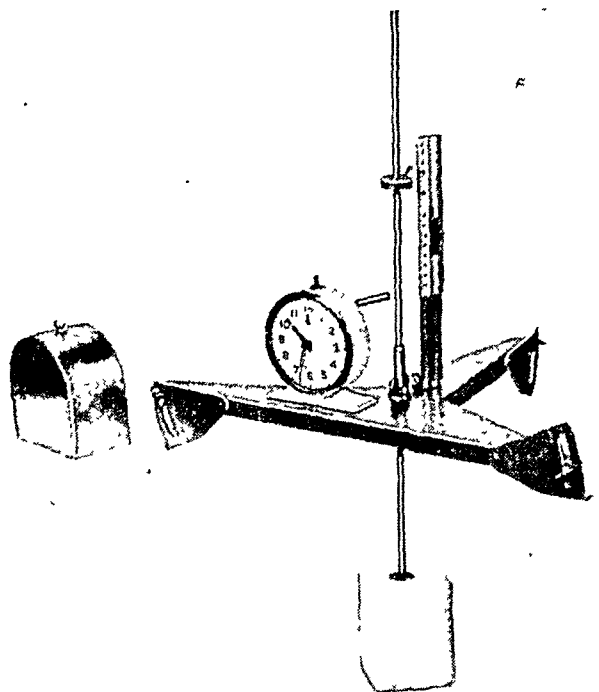
Cities and towns are facing anew the recrudescence of an old and presumably solved problem—sewage disposal. This problem is particularly acute in fringe areas where there have been marked population growths during the past decade (1).

The mushrooming of new residential and industrial building beyond the limits of common sewage disposal services, both inside as well as outside corporate limits, has led to present and latent health hazards. This state of affairs is of pressing interest to health officers as well as sanitary engineers. Municipal sewage systems, with either new or expanded treatment facilities, are costly. However, long-range planning for the metropolitan area, if possible, is considered to be the least expensive and most efficient procedure (2). Extension of facilities street by street, as neighborhoods petition city councils, is an expediency only. For the health officer this situation entails resolving the results of inadequate past control of individual and area sewage disposal. The rules and regulations needed to insure adequate sewage disposal for the present and future must be promulgated as well. The permanent solution to the backlog of sewage disposal nuisances is extension of present common sewage disposal facilities or initiation of a sanitary district (1-3).

Soil Percolation Test

But of immediate import is the approval by the health department of all buildings that re-

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Automatic soil percolation timer.

quire private sewage disposal, since minimum standards for private sewage disposal systems are a part of State regulations and statutes. One important aspect of this method of control, measuring the water absorption capacity of soil, continues to be a time consuming and thus a costly although necessary procedure. There is general agreement that the determination of the porosity of the soil that is to receive septic tank effluent, in conjunction with other factors such as probable sewage load, land slope, water table level, land area, and water supply, is mandatory in order to insure adequate disposal of the effluent (4, 5). However, the present technique of watching water seep out of a hole in the ground is frequently prohibitive in cost to many health departments, for sanitarians performing such tests cannot perform their other manifold and necessary environmental health services.

It is not pertinent here to discuss the dynamics of the absorption of water by soil. However, reasonably accurate criteria for the efficient and safe disposal of septic tank effluent in a tile field have been evolved, based upon soil percolation tests and the other factors mentioned above (4, 6). The area of a tile absorption field is the minimum required for the probable maximum sewage load.

Field experience has shown that soil percolation tests in one disposal field as well as in adjacent building sites may vary markedly (?). In fact, our present technique is to make at least four soil percolation tests for each field disposal area; each test hole is 8 inches wide and 27 to 30 inches deep. The results of such tests in just one Des Moines real estate development of 30 adjacent lots, requiring septic tank sewage disposal systems for 2-3 bedroom houses, illustrated the variability of soil water absorptive capacity in a relatively small area. The lots, each with a 100-foot front by 200 feet deep, were on rolling pasture land with a Webster soil as determined by a geological survey. The feet of tile required in a trench 18 inches wide by 30 inches deep is given below for the various lots.

<i>Feet of tile required</i>	<i>Number of lots</i>	<i>Percent</i>
144 (minimum)-----	0	0
162-198-----	10	33
211-299-----	9	30
300-399-----	7	23
403-480-----	4	14

This is but one example which emphasizes the necessity of soil porosity tests even for adjacent building lots.

Automatic Timing Device

A drawback to the soil percolation test, watching water seep out of a hole in the ground, has been satisfactorily solved by the use of a simple, inexpensive, automatic timing device. The instrument was constructed by our director of the bureau of environmental hygiene and has had a year of field test to date, verifying its accuracy and ease of utilization. The timers can be set up in a few minutes. The sanitarian can then leave the test fields to perform the other functions of a sanitarian. He returns in the late afternoon to pick up the timers and record the percolation times.

A total of 408 absorption fields for 2-3 bedroom houses scattered throughout Des Moines have been tested during the past year, and the following table presents our results, utilizing an automatic soil percolation timer.

<i>Total time needed for 6 inches of water to percolate (minutes)</i>	<i>Number of tests</i>	<i>Average time required for percolation (hours)</i>	<i>Feet of tile required</i>
24	0	0	144
30-60	126	95	162-198
66-120	115	178	211-293
126-240	88	264	300-399
246-360	55	275	403-480
>360	24	144	refused
	408	956	

It is considered that approximately 956 man-hours have been saved by utilizing an automatic timing device, since the time required to set up the devices for the percolation tests is not appreciably longer than preparation for the tests used in present practice. We have had no problem of tampering with the device for several reasons. We know from geological survey data (?) the types of soils in the area and, roughly, their absorptive capacities. The health department program of prevention of septic tank sewage disposal malfunction has been coordinated with interested groups such as the home builders association, real estate board, master plumbers association, zoning boards, mortgage and loan associations, and public officials. Community groups have also been alerted to the available public health service. An intensive educational campaign is a mandatory requirement.

Construction

The percolation timer, constructed of aluminum, consists of a base plate that will rest over any size percolation hole and has legs that will adjust the base to a horizontal position. On the plate is a rugged clock that fits snugly against the stops on the plate. To its rear is the trip mechanism which stops a sprocket wheel when the trigger arm is depressed. The clock has a housing to protect it from rain. The ruler post is fastened upright when in use, and the bottom of the ruler is set at the same height as the top of the trigger arm. The clock is set at noon; the float which has been inserted through the sleeve is assured of free movement by leveling the base. The round tripping ring is screwed tight at the point on the float rod opposite the top of the ruler, thus

setting the mechanism to automatically trip the trigger when 6 inches of water have been dissipated from the test hole. It is seen that the fall of any water column height can be automatically timed. The float is a cellulose compound and standard equipment as a water closet float. With this mechanism, two extra inches of water are used to compensate for water-swollen earth on the bottom of the test hole as well as the level of the float below the surface of the water column, a total of 8 inches of water. Presoaking the test holes 12 hours before the tests is a part of the routine. The reasons for this latter part of the procedure have been adequately presented elsewhere (5, 8, 9).

This automatic percolation timer permits a health department to perform accurate soil percolation tests in many more areas than possible with the present technique. It adds to the officialness and thus the acceptance of the percolation time as an important adjunct to the planning for private sewage disposal systems. And most important, the timer permits health department environmental sanitation personnel to resume other environmental health service functions.

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Federal Food and Drug Laws Violated

The Food and Drug Administration of the U. S. Department of Health, Education, and Welfare reported 119 seizures of food and drug shipments during April 1953. All were civil actions to remove products from the market before they reached the consumer.

One permanent injunction and 27 fines against individuals and firms were also reported during April. One of the fines, \$850, was imposed against an unlicensed operator of a treatment center in Kentucky. Through a "runner" in St. Louis, he supplied worthless herb medicines for out-of-State use to patients, mostly from midwestern States, whom he had diagnosed without physical examination. Several appellate courts have ruled in similar instances that the Federal Food, Drug, and Cosmetic Act is violated when misbranded medicine is offered for interstate transportation even though the "doctor" did not make the shipment.

Establishment of definite responsibility for violating the Federal food and drug laws may mean criminal prosecution for the alleged violator, the Food and Drug Administration has warned.

1952 Summary of Foodborne, Waterborne, and Other Disease Outbreaks

By C. C. DAUER, M.D.

IN ADDITION to reporting cases of specified notifiable diseases, State and Territorial health officers are requested to report promptly all outbreaks or unusual occurrences of communicable and other diseases of public health interest. These specifications are a part of the national morbidity reporting system which has evolved through trial and modification. Its most recent revision was unanimously approved by the Association of State and Territorial Health Officers in October 1951, effective January 1, 1952 (1).

Purpose of Epidemic Reporting

The reporting of disease outbreaks is parallel and complementary to the weekly and annual reporting of cases. Whereas reporting of cases provides the data necessary to develop the incidence rates of diseases, which indicate changes in the relative magnitude of disease problems and the resources that should be allocated to control them, epidemic reporting emphasizes the circumstances of specific outbreaks. Its purpose is not so much to count every case but rather to find, through field epidemiological investigation, the sources and vehicles of infection and, if possible, the specific organism involved.

For purposes of controlling disease, it appears more important to know, for example, that

the cook in a summer camp where an outbreak of typhoid fever occurred was discovered to be a typhoid carrier, or that infection was definitely traced to a polluted well, than that 20 rather than 10 cases occurred.

More specifically, investigation of foodborne outbreaks in 1952 repeatedly showed that the importance of properly storing and refrigerating food and of food handlers keeping their hands clean was not appreciated. It follows that expensive restaurant equipment and complicated licensing arrangements seem to be less significant in controlling disease than compliance with relatively simple measures. Food stored promptly in an inexpensive icebox is less likely to spoil than food placed in the most elaborate refrigerator after a few hours' exposure at room temperature. Thus the qualitative details developed in epidemic reports are essential for pointing the way to specific control measures in States and communities. Prompt reporting of unusual occurrences of disease and the circumstances surrounding them are of special importance at the present time as a defense measure against the threat of biological warfare or other catastrophe.

Scope of the Summary

In keeping with the purposes outlined above, this report has been made as extensive as possible. It summarizes all outbreaks and unusual occurrences of disease, with specific exceptions noted below, considered important by the reporting health officers during 1952. This represents a disease base somewhat broader than was

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used in previous outbreak summaries, which were restricted to foodborne and waterborne diseases (2).

Some of this extension was made possible by the addition to the lists of notifiable diseases, on January 1, 1952, of certain diseases not previously reportable on a national basis. Infectious hepatitis, for example, was mentioned in only 2 or 3 reports during 1951; its addition in 1952 apparently focused attention on its widespread occurrence and led to the reporting of 27 outbreaks. This beginning makes it possible to include the disease in the present summary, though it is obvious that in view of the 17,200 individual cases reported full reporting of infectious hepatitis outbreaks was far from being achieved.

Various other diseases, such as ringworm of the scalp and rickettsialpox, which are not specifically included in the lists of those to be reported to the Public Health Service, are nevertheless reportable in many States. To the extent that such reports were forwarded, they are included in this summary for the first time.

In certain instances, information on an outbreak was first obtained from other Federal agencies. For example, a widespread outbreak of salmonellosis in infants, due to ingestion of infected dried egg yolk, was discovered by the Food and Drug Administration. This exchange of information, resulting from cooperative arrangements, is of mutual benefit to the various agencies concerned.

The outbreak of influenza B early in 1952 is not included because it has been described by the Influenza Information Center, National Institutes of Health (3). Although certain other diseases, notably poliomyelitis, occur in localized epidemics, they are excluded because it is not practicable to report them as outbreaks.

Details of nearly all the individual outbreaks covered in this report have appeared currently in the Communicable Disease Summary issued weekly by the National Office of Vital Statistics.

Limitations of Reporting

The tabulation of outbreaks in the accompanying tables shows very clearly that reporting practices differ widely from State to State. The large number of outbreaks reported by some

States as compared with small numbers or none at all in other States undoubtedly reflects superior reporting practices more than differences in occurrence. In many parts of the country the importance of reporting, investigating, and applying control measures to epidemic diseases is evidently not adequately understood. In some States little effort has been made to overcome the considerable time lag in reporting by physicians and local health departments. In others a vigorous promotion effort seems necessary in order to get any reports at all. This problem of overcoming the difficulties in getting unusual disease situations reported, so that investigations may be made, is of concern not only to the Public Health Service and the State health departments, but to the Food and Drug Administration and the Department of Agriculture, and to analogous agencies in State governments.

Figures on numbers of outbreaks, and particularly on numbers of cases, as shown in the tables, should therefore be regarded as indicative of conditions in States with well-developed reporting systems, rather than as a basis for interstate comparisons. Even in States with the most alert reporting systems, the exact cause of outbreaks is sometimes impossible to determine because specimens for laboratory examination cannot be obtained.

Summary of Findings

Outbreaks of waterborne and milkborne diseases in 1952 were confined to a few States, but outbreaks in which food other than milk was the vehicle of infection occurred in all parts of the country. Faulty methods of handling food and improper storage and refrigeration continued to be found on investigation of many outbreaks. These defects were also evident in the reports of outbreaks in 1951 (2).

Despite progress in sanitation and other health measures, there are many persistent communicable diseases that continue to challenge health authorities. For example, staphylococcal food poisoning, salmonellosis, bacillary dysentery, and many diarrheal diseases of unknown etiology remain as common occurrences, and infectious hepatitis appears to be on the increase.

Vehicle of Infection

Water

A somewhat larger number of waterborne outbreaks of disease was reported in 1952 than in 1951, but the number of persons involved (530) was smaller in 1952.

In one outbreak, well water which became polluted as the result of a blocked sewer was the vehicle of typhoid infection; in another, a dug well supplying water to a restaurant was considered to be the source of typhoid infection. Three other outbreaks of typhoid fever were suspected of being waterborne, but definite proof was lacking.

A large outbreak of infectious hepatitis occurred among persons attending a summer camp in which spring water was shown to be polluted. Three weeks prior to the onset of the hepatitis cases, an outbreak of gastroenteritis had occurred among this group. Eight other outbreaks of undifferentiated gastroenteritis were reported in which water was considered to be the vehicle of infection. Five of these involved the use of polluted wells; one was traced to the use of raw creek water; and in another, low water pressure had permitted water fountain outlets to become contaminated.

Milk and Milk Products

Comparatively few of the outbreaks reported in 1952 were traced to milk or milk products. One milkborne outbreak occurred in an institution which used raw milk produced on the premises. *Streptococcus faecalis* of the viridans group was recovered from the milk. A large epidemic of *Shigella sonnei* dysentery occurred in a school using milk from a dairy. Investigation showed that a batch of milk at this dairy was improperly pasteurized immediately preceding the outbreak, but the source of infection of the milk was not determined. In another instance, milk was only suspected of being the vehicle of infection of a group of 100 cases of gastroenteritis in a school.

Milk products were found to be vehicles of infection in only three small outbreaks of disease. One group of 5 persons became ill after eating cheese; another, of 10 persons, after eating ice cream contaminated with *Salmonella montevideo*; and the third, of 7 persons, after

Foodborne and waterborne disease outbreaks, by vehicle of infection, reported in 1952

State	Water		Milk and milk products		Other foods	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
Total.....	14	530	6	833	143	6,828
Alabama.....					1	5
Arizona.....					4	360
Arkansas.....						
California.....	2	14			29	1,248
Colorado.....	1	8			1	12
Connecticut.....					4	228
Delaware.....						
District of Columbia.....						
Florida.....					4	92
Georgia.....					1	92
Idaho.....						
Illinois.....	1	50			2	47
Indiana.....						
Iowa.....					2	20
Kansas.....						
Kentucky.....					6	318
Louisiana.....					1	40
Maine.....			1	81		
Maryland.....			1	7	3	103
Massachusetts.....			1	62	9	424
Michigan.....					4	279
Minnesota.....					5	670
Mississippi.....					2	264
Missouri.....					7	368
Montana.....						
Nebraska.....						
Nevada.....						
New Hampshire.....						
New Jersey.....						
New Mexico.....						
New York.....	8	232	1	39	30	1,007
North Carolina.....					2	16
North Dakota.....						
Ohio.....					6	100
Oklahoma.....						
Oregon.....					5	596
Pennsylvania.....					1	17
Rhode Island.....					1	20
South Carolina.....						
South Dakota.....					2	44
Tennessee.....	2	226	2	644	1	4
Texas.....					1	15
Utah.....						
Vermont.....						
Virginia.....					1	5
Washington.....					1	120
West Virginia.....					3	110
Wisconsin.....						
Wyoming.....					1	16
Alaska.....						
Hawaii.....					3	208

¹ Reported from ship in port city.

Foodborne, waterborne, and other disease outbreaks, by type of infection, reported in 1952

State	Typhoid fever		Salmonellosis		Bacillary dysentery		Trichinosis		Staphylococcal food poisoning		Gastroenteritis, type not stated		Infectious hepatitis		Streptococcal sore throat		Diphtheria	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
Total.....	11	156	31	1,335	12	1,441	5	40	77	3,798	50	2,049	27	1,306	5	363	8	269
Alabama.....													2	59			2	98
Arizona.....									1	5			1	200				
Arkansas.....									3	310	1	50	1	17				
California.....	1	3	5	120	1	37	2	17	13	835	9	274	2	31				
Colorado.....	3	26																
Connecticut.....			1	70					3	158			1	19				
Delaware.....																		
District of Columbia.....			1	2							2	5	2	8				
Florida.....					1	174			4	92			1	11				
Georgia.....	1	11									1	92						
Idaho.....	1	5							1	29								
Illinois.....			1	11							2	86						
Indiana.....																		
Iowa.....							1	15	1	5								
Kansas.....																		
Kentucky.....			2	236					2	78	2	4						
Louisiana.....									1	40								
Maine.....			1	3											1	81		
Maryland.....			2	52					1	45	1	13					1	17
Massachusetts.....			6	336	1	36			3	29	1	6			2	144		
Michigan.....			2	191					2	88	1	18						
Minnesota.....	1	7			1	162			5	663							1	3
Mississippi.....			1	14							2	253	3	62				
Missouri.....			1	103	1	152			4	108	2	7	1	27				
Montana.....																		
Nebraska.....													1	15	1	86		
Nevada.....																		
New Hampshire.....																		
New Jersey.....																		
New Mexico.....													1	21				
New York.....	4	104	5	103	6	241	1	4	15	444	16	680	2	64	1	52	1	7
North Carolina.....									1	2	1	14						
North Dakota.....																		
Ohio.....							1	4	5	96	1	3	1	33			2	27
Oklahoma.....																		
Oregon.....			1	40					2	404	1	150						
Pennsylvania.....											1	17						
Rhode Island.....									1	20								
South Carolina.....													2	165				
South Dakota.....									2	44								
Tennessee.....					1	639			1	4	2	127	1	104				
Texas.....											1	15						
Utah.....			1	40							1	100	1	7				
Vermont.....																		
Virginia.....											1	5						
Washington.....									1	120			1	100				
West Virginia.....			1	5					2	105			1	200				
Wisconsin.....													1	7				
Wyoming.....									1	16								
Alaska.....													1	156			1	117
Hawaii.....									2	58	1	150						

¹ Reported from ship in port city.

drinking eggnog from which a *Salmonella* organism was isolated.

Poultry and Eggs

Poultry and eggs were far more important than milk or water as sources or vehicles of infection. In 39 outbreaks, a large proportion of which were proved or suspected to be *Salmonella* infections, chicken or turkey, more often the latter, were proved or suspected to be the vehicles of infection. In a disease outbreak in a family group, eggnog was found to contain a type C *Salmonella* organism, and *Salmonella* infections in infants in many parts of the country were traced to a powdered egg yolk product. These reports very clearly indicate that fowl and eggs constitute a large reservoir of infection, and they emphasize the need for more effective measures to prevent transmission of infection to man.

Shellfish

Only one outbreak of 66 cases was reported in which raw shellfish were consumed. There was no definite proof of contamination of the raw clams eaten at a country club dinner, but no other source of infection for the outbreak could be found.

Types of Infection

Staphylococcal Food Poisoning

Laboratory evidence of the presence of a staphylococcus in food was available for 32 outbreaks of food poisoning, and epidemiological investigation indicated this type of food poisoning in 45 additional outbreaks. Of these 77 outbreaks, a cream-filled pastry was involved in 15; ham, in 21; turkey or chicken, in 10; and salads, in 10.

In 28, or approximately one-third of the 77 outbreaks, lack of or inadequate refrigeration was considered to have been a contributing factor. In 5, a food handler was found to have lesions or infections on his hand; in 3, a food handler had a throat infection; in 4, foodhandling procedures were considered unsatisfactory; and in 1, a dirty meat grinder was considered to have been the source of contamination.

These outbreaks were distributed as to place of occurrence or source as follows: schools and institutions, 26 percent; public eating places, 25 percent; banquets and picnics, 19 percent;

homes, 15 percent; and following purchase of food from bakeries, 15 percent.

Typhoid Fever

Eleven outbreaks of typhoid fever, consisting of 152 cases, were reported from 5 States in 1952, as compared with 3 outbreaks in 1951. In four instances, carriers, not previously known, had prepared food eaten by persons who became ill. In one of these occurring in a day camp, the camp cook was discovered to be a carrier through an examination of food handlers. Water was suspected of being the vehicle of infection in two outbreaks, but bacteriological evidence was lacking. Contaminated well water was shown to be the source of infection in two other outbreaks, and the use of polluted river water was demonstrated in another. In one family outbreak, no source of infection could be found. Milk was not suspected of being the vehicle in any typhoid fever outbreak.

Bacillary Dysentery

One of the 12 reported outbreaks of bacillary dysentery, or shigellosis, was considered to be milkborne, but none waterborne. These outbreaks, consisting of 1,441 cases, resulted in 13 deaths. In the milkborne outbreak, consisting of 639 cases in a school, epidemiological investigation revealed that pasteurization had been improperly carried out, but the source of infection of the milk was not discovered. One outbreak of 36 cases and 12 deaths in an institution was considered to be a person-to-person type of infection. Two outbreaks were considered to have been transmitted by food other than milk—in one instance, a tuna fish salad.

In 9 of the 12 outbreaks, *Shigella sonnei* type of infection was demonstrated, and a Flexner type of *Shigella paradysenteriae* was found in the remaining 3.

Salmonellosis

Outbreaks of salmonellosis in 1952 were reported to have occurred under a variety of conditions, namely, in a nursery for newborn infants; following banquets, church suppers, and picnics in institutions and schools; in a jail; in private homes; and often following eating in restaurants. In 15 outbreaks, consisting of 597 cases and 2 deaths, *Salmonella* organisms were identified as follows: *S. typhimurium*, in

7; *S. oranienburg*, *S. heidelberg*, and *S. newport*, in 1 each; and an organism in group C, in 2. Five of these outbreaks followed ingestion of turkey or chicken meat, and in one, homemade eggnog was presumed to have been contaminated by raw eggs.

Sixteen other outbreaks, involving 738 cases, were reported in which laboratory confirmation of the diagnosis was lacking. In 14 of these, turkey or chicken meat was regarded as the vehicle of infection; 1 occurred in a nursery; and in the remaining 1, barbecued beef appeared to be the vehicle.

In addition to these outbreaks, cases of salmonellosis among infants with a history of ingestion of dried egg yolk were reported from many parts of the country. Early in November it was recognized that a few cases followed the ingestion of dried egg yolk processed by a single manufacturer. The first so recognized was in the District of Columbia, and soon after suspect cases were found in New York City. Presence of *S. montevideo* was demonstrated in the stools of sick infants and in samples of certain code numbers of the egg product. All State health officers were then notified to investigate and report any cases of salmonellosis coming to their attention. Contamination of the dried egg yolk was demonstrated throughout the whole range of production, which began about the middle of 1952. Sale of the product began in July and all unsold supplies were recalled in November.

Laboratory confirmation of diagnosis was obtained in over 50 such cases in 16 States and the District of Columbia. In an additional 40 cases laboratory evidence of infection was not mentioned in the report. These *Salmonella* infections were predominantly *S. montevideo*, but *S. barielly*, *S. oranienburg*, and *S. tennessee* were also reported. Nearly all cases were reported to be mild and there were no deaths.

Undifferentiated Gastroenteritis

In 50 outbreaks of disease, there was insufficient information to determine the type of infection. In 8 of these, water was considered to be the source of infection. In 1 outbreak, where creek water was used as drinking water, "a good many" cases were reported. In 2 outbreaks, 50 persons became ill after drinking water from

wells, investigation of which disclosed seepage from septic tanks; and in 2 others, faulty chlorination had preceded the outbreak.

Trichinosis

Five outbreaks of trichinosis were reported in 3 States. In 3 of the outbreaks, the patients had eaten partially cooked or uncooked pork, and in the fourth, 7 of 9 persons who had eaten bear meat developed symptoms 14 to 17 days after exposure. The bear meat had been in cold storage 10 days and then frozen.

Botulism

Only 2 small outbreaks of botulism were reported in 1952, 1 in California and 1 in Oregon. In one, in which 3 persons were ill and 2 died, home-canned mushrooms were involved. In the other, involving 2 persons, both of whom died, home-canned beets were found to be contaminated. Both groups of cases were caused by botulinus toxin type A.

Streptococcal Infections

Five outbreaks of streptococcal infection were reported, 4 of them involving 359 cases and no deaths and the fifth involving a "communitywide area." Epidemiological investigation of one group of 82 cases, which occurred in a hospital, indicated that the outbreak was foodborne, but the specific item of food was not identified. An outbreak in an institution for boys, in which 62 of 195 persons exposed developed the infection, was traced to a viridans type of streptococcus in raw milk. A group of 81 cases of streptococcal sore throat was reported among persons who had eaten warmed-over stew in a college dormitory dining room, which served about 600 persons. *Streptococcus viridans* was isolated from the purulent discharge from the thumb of a cook and from throats of the ill persons.

Outbreaks in Military Personnel

Sixty-nine disease outbreaks were reported in various units of the armed services stationed in continental United States in 1952. A total of 3,833 persons were affected. Thirty-seven, or more than half, of these outbreaks, were classified as food poisoning. One outbreak, involving 78 persons, was identified as bacillary

dysentery. Six, involving an unknown number of persons, were shown to be *Salmonella* infections. Others were reported merely as diarrhea or gastroenteritis. None of these outbreaks are included in the data given in the accompanying tables.

Other Disease Outbreaks

A number of disease outbreaks not attributed to food or water were also reported during 1952. These included diseases spread by person-to-person contact and those in which animals or arthropods were the source of infection.

Infectious Hepatitis

Outbreaks of infectious hepatitis reported in 1952 numbered 27. The 1,306 cases in these outbreaks, however, represent only a small fraction of the 17,200 cases reported in weekly telegraphic reports. The numbers reported in the outbreaks varied from a few to 200. Several of these outbreaks occurred predominantly in school populations or among college students; 2, in summer camps; 3, in housing developments; and 2, at Indian reservations or schools. Person-to-person contact was considered to be the principal mode of transmission. However, in one outbreak occurring on an island, nearly all persons affected were users of the same water supply. Another outbreak of 104 cases among persons attending a church camp was preceded by an epidemic of gastroenteritis. In this instance, it was clearly demonstrated by use of a dye that the spring water supply of the camp was contaminated by a leak in the sewer line from one cottage.

Diphtheria

In spite of the fact that diphtheria has shown a steady decline in incidence for many years, 8 outbreaks with 269 cases and 6 deaths were reported in 5 States and Territories in 1952. One small outbreak at an Indian reservation was characterized as an occurrence of "black" diphtheria. Seven cases with two deaths occurred in an institutional outbreak. One outbreak of 64 cases was confined to a single area of a city, and another was believed to have occurred because medical services provided in the community had emphasized curative rather than preventive measures.

Psittacosis

Several family outbreaks of psittacosis were reported. Two outbreaks of 3 cases each followed contact with sick parakeets in the home; another involved 2 persons. Outbreaks of the disease were also reported among workers in a poultry processing plant, and a group of three cases occurred among railway express employees who had contact with psittacine birds being shipped. Investigations indicated that pigeons and canaries were sources of infection of individual cases reported in various parts of the country.

Miscellaneous Diseases

Anthrax was reported in a large number of domestic animals, mostly swine, in the north central States early in 1952. Contaminated bonemeal was found to be the vehicle of infection. Two cases in humans for whom there was a history of contact with diseased animals or with the contaminated feed, and a number of cases in animals following vaccination against the disease were also reported.

Twelve cases of tularemia occurred in a family group as the result of contact with a wild rabbit. An outbreak of rickettsialpox occurred among persons living in an apartment, investigation of which revealed large numbers of house mice and mouse mites in the vicinity of the apartment incinerator.

Other outbreaks reported included ringworm of the scalp in a group of school children, encephalitis in the central valley of California, several groups of cases in which Cocksackie virus was regarded as the probable infectious agent, a small group of malaria cases in children attending a summer camp, trachoma at an Indian reservation, and a group of cases diagnosed as primary atypical pneumonia in an institution.

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Protozoans in Stools

Unpreserved and Preserved

In PVA-Fixative

By MORRIS GOLDMAN, Sc.D., and
MARION M. BROOKE, Sc.D.

In an earlier report (1), we demonstrated the effectiveness of polyvinyl alcohol (PVA) fixative in preserving the trophozoites of the intestinal amebas and recommended that it be incorporated in a two-bottle outfit for the collection of stool specimens whenever it was not possible to have them examined immediately. This method of collection is particularly applicable to public health laboratories which generally receive specimens for diagnosis through the mail. The present study compares the relative effectiveness of the PVA-fixative technique and other procedures in detecting intestinal protozoans in feces.

Materials and Methods

Arrangements were made with the Grady Memorial Hospital in Atlanta whereby stool specimens were collected and sent to the Communicable Disease Center laboratory of the Public Health Service in Atlanta for examination. Part of each normally passed, fresh stool was immediately preserved in PVA-fixative, and a part was left unpreserved. All specimens were over 4 hours old when they reached the laboratory.

Patients submitting stools included new hospital admissions and individuals suspected of having amebic or other intestinal infections. Five hundred specimens were submitted from approximately 270 patients. Since the specimens were generally identified only by the pa-

tient's last name, it was not possible to tell in every instance whether the patient was a repeat case or a new one. For these reasons, the percentages of the parasites found in this study do not indicate infection rates of a population. They represent only what was found in 500 separate stool specimens examined by various techniques.

Examination

The unpreserved portions were examined by direct wet mounts (saline and iodine), modified zinc sulfate concentrations, and hematoxylin-stained direct smears, the methods for which are described in techniques 1, 2, and 3 below. The PVA-preserved portions were examined by hematoxylin-stains of PVA films, as explained in technique 4.

Technique 1. A fleck of feces was mixed with a drop of saline and covered with a 22 mm. square cover slip. A similar preparation was made using an iodine solution. The entire saline mount was carefully examined. The iodine mount was used to assist in identifying organisms which were found in the saline preparation.

Technique 2. Approximately 1 gm. of feces was mixed with tapwater in a 14 by 85 mm. test tube. The test tube was centrifuged at 2,000 r. p. m. for 1 minute. The supernatant was poured off, and the tube was refilled not quite to the top with zinc sulfate solution (specific gravity 1.18). After a second centrifugation at 2,000 r. p. m. for 1 minute, the tube was placed on a rack, and sufficient zinc sulfate solution was added with a dropper to raise the meniscus above the top of the tube. A 22 mm. square cover slip was carefully superimposed on the tube and allowed to remain undisturbed for 5 to 10 minutes. At the end of that time, the cover slip was removed, lowered onto a drop of iodine solution on a slide, and examined.

Technique 3. Flecks of feces were spread in thin films on two 75 by 25 mm. slides, which were immediately immersed in Schaudinn's fixative. One slide was then stained by the Tompkins-Miller rapid hematoxylin technique (2). When the results of this method were not criti-

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Table 3. Number of identified infections found by various combinations of techniques

Combination of techniques	<i>Endamoeba histolytica</i>		<i>Endamoeba coli</i>		<i>Endolimax nana</i>		All species	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Unpreserved portions (techniques 1, 2, and 3)-----	27	71	32	82	44	62	117	66
Hematoxylin-stained PVA film-----	28	74	25	64	67	94	146	82
PVA-fixative plus direct wet mount-----	28	74	33	85	68	96	156	88
PVA-fixative plus modified zinc sulfate concentration-----	33	87	39	100	70	99	169	95
PVA-fixative plus hematoxylin-stained direct smear-----	33	87	29	74	70	99	160	90
All 4 techniques-----	38	100	39	100	71	100	178	100

sulfate methods would appear to be the most efficient combination of techniques. With these 2 methods it was possible to find 95 percent of the identified infections found by all 4 methods (169 of 178). The other 2 combinations—PVA-fixative plus hematoxylin-stained direct smears and PVA-fixative plus direct wet mounts—revealed 90 and 88 percent, respectively, of the total infections identified.

Unidentified Organisms. Of 16 cases where organisms were seen but were not specifically identified in the PVA-fixed portions (table 1), 12 (75 percent) were trophozoites. In most cases, these were *Endamoeba* organisms which could not be diagnosed definitely as either *histolytica* or *coli*. In our experience it has been impossible to identify specifically a proportion of *Endamoeba* trophozoites in stained preparations on the basis of the classic descriptions of the two intestinal species.

Since, in this study, the unpreserved specimens were several hours old when examined, the organisms not identified by the other techniques were mostly rare distorted cysts or degenerated trophozoites. When the resources of all 4 techniques were used, the number of organisms not identified was 15 compared to 178 identified, or 8 percent of all organisms seen.

Summary

Five hundred normally passed stool specimens were divided into two portions immediately after passage. One portion was left un-

preserved; the other was preserved in PVA-fixative. The unpreserved portions were examined by direct wet mounts, zinc sulfate concentrations, and hematoxylin-stained direct smears. The preserved portions were examined by hematoxylin stains of PVA films. All examinations were performed no sooner than 4 hours after the stool was passed.

The PVA-fixative portions revealed more infections with protozoans than did all 3 other techniques combined, mainly as a result of the preservation of trophozoites. Trophozoites were found in 63 percent of all infections detected and in 59 percent of the infections found in formed stools. This suggests that it is advisable to preserve both formed and soft stools in PVA-fixative. The combination of the PVA-fixative method (for trophozoites) and the zinc sulfate method (for cysts) demonstrated more infections than did any other combination of 2 techniques used in this study.

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Technical Assistance for Public Health In the Republic of Indonesia

By E. ROSS JENNEY, M.D., M.P.H.

DESPITE the magnitude and complexity of public health problems in Indonesia, to conclude that the great need depicted there indicates, a priori, a corresponding scope for technical assistance would be a mistake. A sudden catastrophe in a highly organized society will utilize relief in direct proportion to need; but a socioeconomic dilemma developing over the centuries, like that which does exist in Indonesia, is probably of such a character as to limit sharply the fulfillment of its most desperate requirements.

The generalization may even be made that under these circumstances the capacity of an underdeveloped area to absorb technical assist-

Introductory to understanding the health problems of Indonesia and the difficulties of administering technical aid in Southeast Asia is Dr. Jenney's background report on "Public Health in Indonesia" in the April 1953 issue of Public Health Reports (p. 409).

A commissioned officer in the Public Health Service, Dr. Jenney was assigned for 2½ years to the Technical Cooperation Administration (TCA) Mission to Indonesia as chief of the public health division. Dr. Jenney's current assignment has taken him to Santiago, Chile, as chief of the health and sanitation field party of the Institute of Inter-American Affairs.

Another aspect of technical assistance in Indonesia—in this instance the special problems encountered in two rural polyclinics in Middle Java—is described by Warren A. Ketterer on p. 558 of the June issue.

ance is inversely proportional to its need. Therefore, the corrective effort chosen should not precipitate a host of new problems by creating an unreasonable demand for housing, power, roads, transportation, interpreters, and the like. Regardless of the need and the amount of available aid, the vital measure of what can be done is the absorptive capacity of the area.

Need for Foreign Assistance

An extraordinary number of surveys in the public health field have been made in Indonesia by a variety of agencies and individuals. Indonesian officials have reached the saturation point in the number of ideas which they can receive as to what should be done, and they are understandably skeptical about new proposals. Actually, the need for foreign assistance is fully recognized, and the Government is availing itself of aid proffered by the United Nations agencies, Technical Cooperation Administration, and other organizations.

Since foreign assistance and local capacity to absorb technical assistance are both perforce small in relation to the need in Indonesia, a big task falls on the shoulders of those who are guiding technical assistance and upon the Indonesian officials who are responsible for devising its efficient application. Measures of need in the form of surveys are necessary, as are estimates of indigenous resources, but the actual problem in Indonesia is to select a point of beginning, to choose an open avenue of approach which will not prove to be an ultimate dead end.

The need for technical assistance in Indonesia in the public health field does not differ basically from the need for more outright economic aid. During the 3½ years of Japanese occupation in World War II and during the subsequent struggle for independence, public health facilities on the group of islands deteriorated. Technical health personnel were lost to the islands because of the exodus of many of the Dutch. The same is true of agriculture, engineering, and mining: everywhere there is a shortage of tools and of those who know how to use them. A rapidly increasing population progressively accentuates these deficiencies, and a preoccupation with the complexities of new sovereignty and its political implications of hope and of disappointment compromises the effectiveness of remedial measures.

This preoccupation is exasperating to all those whose technical talents and professional thinking were developed in an environment of economic, social, and political stability. But the preoccupation is real, and it is not to be overridden by any plan of proffered assistance which does not recognize and sympathize with the fact that Indonesian Government officials are all filling dual and triple positions, each position enmeshed with a complexity of political and administrative issues. Eager to utilize either the short-range impact value or the long-range economic value of any project, the Indonesian Government is examining every opportunity to lessen the disappointment of the country in discovering the initial problems of independence.

The reaction which a given community may develop as a consequence of receiving a service previously unknown is somewhat irrelevant to the actual situation confronting the Indonesian Ministry of Health. Indonesian officials are naturally impatient with schemes which introduce a new service in a limited sphere while the major issue of rehabilitating former services remains unaffected. This attitude does not mean a condemnation of a scheme per se but simply an impatience with its irrelevancy at this time. When the load is heavy, foreign assistance should add another horse rather than another cart.

The large rural population of Indonesia is relatively stable, and its stability is based on the

subsistence-level individual farmer. The people are illiterate, patient, intelligent, and receptive, but not reactive. They harbor guerrillas, but they do not mobilize armies; they absorb ideology, but they resist the call-to-arms phase of propaganda. The rural population has a keen desire to participate in new developments which may improve its economy, regardless of the source, but it likes to feel the impact of such developments through its own Government. However, many areas seem to have a natural taste for local autonomy.

The indications are that the rural recipient of technical assistance is being and will be reached by assistance which is channeled through the Ministry of Health. Reaction which redounds through official health channels is far more effective in the long run than reaction which develops from assistance dropped, as from a parachute, to an isolated rural community.

Choice of Approach

The task of national planning in a situation such as prevails in Indonesia is new. Only recently has public health advancement in a large underprivileged population been considered as the full responsibility of an indigenous government. The task requires a different orientation from that evolved by colonial governments, missionary organizations, and the like. The task of national planning comes at a time when new insecticides and new drugs have changed the mechanism of disease control projects and at a time when global air transport facilitates rapid interchange of technical personnel. Most important, it follows at the heels of the "awakening of Asia."

The situation in Indonesia has certain distinct features which accentuate or modify the health picture, making it somewhat unique. Geographically, the Republic of Indonesia is the most complex nation on earth, and this complexity accentuates the logistics of transportation and communication. Its health services, although qualitatively good, are quantitatively perhaps the most deficient of any nation. Indonesia also faces a rather formidable language problem, since its secondary language—Dutch—is of limited use in general interna-

tional contacts. This forces the Indonesians to make special effort to speak English and creates a demand in many Government departments for English-speaking officials, many of whom are leading physicians and surgeons withdrawn from their medical activities by the Government.

With trained personnel and funds so scarce in relation to the need, the choice of the most expedient approach to meeting the need cannot be influenced by prejudices previously formed in an atmosphere of affluence. Those who have faced decisions in similar situations will agree that it is not an easy concept to keep constantly in mind. The age-old puzzle presents itself: which dollar is the most expedient in a given situation—one, the dollar spent in economic improvement with its consequent effect on health and education; two, the dollar spent on education with its effect on health and economics; or three, the dollar spent on health to provide manpower for economic development and sound minds for education?

Question of Emphasis

This choice of accent assails the planner at every step whether he is thinking in terms of the entire nation or of a single village. It will be a long time before there will be the human and financial resources in Asia to allow a simultaneous approach to all three avenues on an adequate scale. Occasionally, the choice is easy, but centuries of failures throughout world history give evidence that the weak spot in the eternal cycle of ignorance, poverty, and disease has been recognized by hindsight more readily than by foresight.

There are areas in Indonesia which have been drained of their best intellects because education provided opportunity for better reward elsewhere. One of the most poverty-stricken areas, with an infant mortality of 53 percent, is paradoxically one of the most literate areas. The failure here was perhaps because education was at an academic level, neglecting the more basic local needs at the trade school or agricultural school level.

Again, obvious failures can be seen in the transmigration areas of Sumatra and Celebes to which Javanese farmers were transplanted.

Some of these transigrations resulted in tragic debacles because of malaria, which should have been the first consideration. Consequently, the elaborate economic preparations—and even educational and clinical facilities—proved to be expensive and futile plans, defeated by the overlooked mosquito. The abandoned paddies remain as monuments to the oversight.

Trend of Foreign Assistance

All issues which have given rise to a need for technical assistance in Indonesia are influenced by either one of two factors. One of these is the underdevelopment of resources. Another very different factor is the deterioration of what has already been developed. The former is too extensive to measure—the need can only be identified; it is immeasurable in relation to present capacities to meet it. The latter—deterioration of what has been developed—is measurable and therefore is useful in planning; it can be weighed against existing capacities to correct it with available assistance. The rehabilitation of a worthwhile but deteriorating health facility is a tangible and sound objective. In Indonesia, there is ample opportunity in this field because of the framework of public health facilities instituted under the Dutch but severely depleted during World War II and because of the subsequent period of protracted military action.

This deterioration, which leads to a disappointment to Indonesia as it first experiences freedom, is only part of a general progressive decline in many fields other than public health. The restitution of public health services has an advantage in that it is not fraught with the quandaries encountered in the economic field, such as the feasibility of rebuilding a sugar mill in the face of doubtful markets.

In the health field in Indonesia, technical assistance, supplies, and equipment from outside agencies are being devoted to (a) major disease control projects which introduce effective methods and which are administratively feasible under the present circumstances, particularly in yaws and malaria; (b) educational projects in professional and subprofessional medical fields and in popular health educa-

tion; (c) the support of certain indigenous preventive programs selected partly because they are in a position to utilize assistance to full advantage and to continue in the future; and (d) emergency items to replenish depleted medical services.

Psychological Aspects

Many devices have been used to illustrate the conflict arising when a conventional Eastern mind meets a conventional Western mind. In this day of airborne technicians and consultants, the conflict has a new meaning in terms of its potentiality for wrecking plans. A necessary part of planning, therefore, is the consideration of the tendencies of the East to misinterpret Western methods and of the West to overestimate the applicability of these methods. In the past it has been possible for the various agencies on encountering this conflict to allow time for adjustment and to select men of experience who were prepared to dedicate a substantial portion of their lives to reach an understanding with the Eastern mind. During the last few years, however, countless Western technicians have been sent to the East and have been given perhaps no more than a few days to establish a liaison which history has proved to be difficult to obtain in years. To these men it is a matter of desperate necessity constantly to check their own prejudices, of which they may have been unaware, and the prejudices of the East, which Eastern officials by virtue of courtesy and restraint do not reveal at once.

The newly arrived Western technical expert will be disappointed if he places too much confidence in community reaction. Eastern communities are cohesive units in certain aspects pertaining to well-established cultural mores, but they are not apt to produce a joint-action response to an innovation. They do not "write to their congressmen" to demand action for their community.

Achieving Cooperation

Because of a deep cultural stability, which cannot be moved with bulldozer and steam shovel techniques, Eastern communities are resilient in absorbing external shock. A sense of courtesy prevents an Eastern official from

explaining in advance that a particular project is in opposition to the established cultural pattern. The Western technician must anticipate what opposition to expect if he is to see his project not defeated, but he rarely will be warned. New methods are not resented—quite the contrary—but their adoption depends on the method of introduction. There is always a right way and a wrong way to introduce them depending on the cultural climate of the area concerned.

In the East, every situation must be explored completely; if not, an elaborate program may collapse because no one had discovered that the ferry boat—"it was shown on the map"—no longer exists. Printing facilities, communications, transportation, housing, electricity, and interpreters and stenographers are all on an "if available" basis. The East receives its supplies from many sources; so, the ribbon may not fit the typewriter, nor the electric bulb the socket, nor the needle the syringe. These irritations may be minor or they may be of sufficient magnitude to compromise an entire project.

In a nation the size of Indonesia, one must beware of being too well satisfied with progress in any single instance, particularly if it represents an insignificant fraction of the whole. The philosophy of "any good is good however small" is all very well, but the quart of water should be used to prime the pump rather than given to the passer-by. Technical assistance meant to have catalytic effect should reach the people through agencies which can be expected to continue the work permanently. The development of a single isolated project is useful in the national sense only when it is designed to serve as a demonstration center for teaching purposes. The demonstration center development in Indonesia has been a happy compromise between the danger of losing effect by dissipation of effort on the one hand or losing effect by single-area concentration on the other, but here again the demonstration center had to be associated with a permanent and dependable agency.

The Eastern official participating in cooperative development programs tends to assume that he can bridge the gap between Eastern and Western technology by acquiring the latest, the

largest, and the most complicated apparatus without thought for its maintenance, operation, or utility. This is a well-known tendency and certainly is not exclusively Eastern. It is exemplified by expensive X-ray units combined with inadequate darkroom procedures, or by huge tractors for small fields. Avoiding such errors as these is often the first, and sometimes the most important, element in a technical assistant's contribution.

Difference in Attitudes

An eagerness to institute research may present a formidable problem. The Eastern mind is particularly adapted to investigation, and its achievements are too well known to need comment. However, because of the progress of research in the West during the war years, a grant in the East today may lead to unnecessary duplication or to the exploration of remote aspects of the problem before the application of basic knowledge. Research must not be discouraged, yet the assisting agency must assure itself that established principles are followed in the programs for which it is responsible. The severing of scientific liaison between the East and the West during the war has produced a confusion which will require many years of positive action to correct before research in the two areas will complement rather than overlap.

The Eastern physician tends to focus his efforts on therapeutic medicine rather than on preventive medicine because of the much greater personal reward in the former branch of medicine. This is true the world over, but the contrast in the East is greater, where the choice may be between wealth and fame and poverty and anonymity. The Western technician can assist in correcting this discrepancy; indeed, it is one of his basic objectives. The task, however, is profoundly difficult until community responsibility for the preservation of health has been acknowledged. Until that comes about, the demand will be for therapy, and the response will be in accordance with the demand. The most constructive step to take in the meantime is for organized teams to demonstrate the value of preventive medicine to the community.

The Eastern mind is not as conscious of the importance of problem-solving as is the Western mind. In the East, to acknowledge the

existence of a problem is often considered adequate. There, if a community is told that something "will be done as soon as possible," the "when?" will not be asked. This Eastern reaction, of course, stems from a long experience with deprivation, but it is also a reflection of the difference between East and West in concept of time. This attitude is not a matter of indifference nor of procrastination: it is something quite apart and is difficult for the foreign mind to comprehend. Six months hence and twelve months hence represent not different times, but simply—"the future." This attitude toward time produces an exasperating conflict with Western scheduled methods, but there is a certain realistic wisdom in it which gradually induces the Westerner, perhaps not to adopt the same attitude but to recognize it as locally meaningful, at least until the "something must be done about it" philosophy is accepted in the East.

Finally, either Westerner or Easterner may assume that all difficulties in an ex-colonial nation stem from mismanagement by the former colonial power. This may well be true in specific instances but to adopt any broad generalization is a dangerous obstacle to clear thinking. One must first look critically at the status of those nations or areas of nations which have never experienced colonialism. The adoption of the scapegoat philosophy to explain shortcomings is certainly no help as a basis for discussion and will soon develop a false sense of optimism as to the likelihood of success. The common phrase "nothing has been done for these people" is easy to repeat off-hand, but it is not always supported by a study of the facts. A careful investigation of facts will often show a long history of desperately frustrated effort on the part of the local people against insurmountable odds or against factors which, it must be remembered, were insurmountable until the advent of such effective agents as DDT and the antibiotics.

Java and Demography

The foregoing has depicted certain problems which challenge the planning capabilities of public health authorities in Indonesia. It must be acknowledged that these problems are com-

plicated by certain logistic factors of a magnitude rarely encountered. In some respects they are specifically Indonesian problems because of the extraordinary geography of this nation of islands. The public health planner, however, when considering such obstacles, is confronted by an ominous population situation which overwhelms all other aspects. As a demographic dilemma, the Island of Java is one of the world's most crucial spots. To appreciate this, an academic background is unnecessary: living in Java is enough to instill a sense of dangerous human saturation.

Estimated at 10 million a hundred years ago, the population of Java and nearby Madura is now 52 million and is now increasing by more than 5 million persons a decade. Although the gravity of the situation had been long recognized by the Dutch, the 1930 census figures of 41 million, the population of France at that time, first focused world attention on Java as an island of incredible population density. In 1930, the birth rate of Java and Madura was reported as 27.9 per 1,000 people and the death rate as 19.9. The present rate of increase is thought to be at least 1.5 percent a year, which, unless there are intervening deterrents, would bring the population of Java and Madura to over 100 million before the end of the century. Whether the less severe population deterrents observed in similar situations will obtain in Java, or whether the most paradoxical famine the world has yet experienced will develop in this garden island remains to be seen.

Supply of Rice

Population increase has more than kept pace with increased productivity of rice by irrigation, fertilization, and improved seed, but in Java a finite remedial limit to this productivity is not far away. The per capita daily cost of rice—rice is the hinge of Java's economy—has risen to a figure which is approaching the basic daily wage while rice imports are exceeding a half million metric tons a year.

Some relief may be afforded by a change in food habits, but perhaps the most hopeful project, or at least one that may postpone the crisis longer than any other, is mechanized rice production. This project proposes the development in Borneo, in Sumatra, and in Celebes of

mechanized production areas, operated largely to supply rice to Java's millions.

The story of two disasters reveals the precarious position of the Javanese economy more dramatically than economic theories. The first disaster was the depression of 1929, which struck a sudden and fearful blow at the economy of Java. The second was the Japanese occupation of the island, which brought to light the dangerous imbalance between rice and population. World War II cut off vital imports at the same time that the Japanese army was withdrawing rice from Java to feed its troops in New Guinea. The result was widespread starvation in Java and an estimated 2 million deaths.

No Ready Solution

Reduction of population growth by control measures would require a mutation in cultural mores over a period of time too long to solve the problem of imbalance. Permissible polygamy, the prestige value of early marriage and large families, and the status of women in general are all contributing cultural factors. In the absence of any other form of insurance, the value of many children and grandchildren in an agricultural family is an age-old incentive for uncontrolled reproduction.

Since all Indonesia except Java and Madura is relatively sparsely settled, the concept of transmigration is appealing. Transmigration was begun many years ago by the Dutch. Because it is a sound project for economic development, it will probably continue, but it can have little effect on the population of an island that is increasing by more than a half million persons a year.

While we are promulgating public health programs in the presence of such a formidable dilemma, we hear protest against measures which will decrease infant mortality and only add to the magnitude of the impending disaster. There always has been headshaking over the wisdom of saving lives in famine areas, but in recent years the headshaking has given way to concise and sometimes cynical expressions of disapproval. Public health measures are attacked for doing no more than preserving lives for ultimate starvation. Since we face the choice between disease and famine, so the critics

say, let us preserve disease to eliminate a fraction of the population so that we can avoid famine for the whole. This is indeed a strange bedfellow to be espoused in the cause of human welfare.

To preserve disease is to allow unnecessary death and incapacity for work. How much of a gap is there between allowing death and arranging it? The proposal is dangerously close to genocide and is unacceptable even if it were not known that birth rates rise with disease, ignorance, and poverty and eventually decline with better health, education, and economic status. The fact that the reaction is eventual, and not immediate, can have no bearing on the wisdom of the objective selected, for no solution is immediate.

No program devoted to human welfare can afford to treat disease, poverty, and ignorance as if they were separate entities striking a community merely by coincidence. We know too well that they are part of one another, inseparable in both cause and solution. One can scarcely imagine a malaria-stricken farming population staggering off to increase the rice yield, of yaws-infected school children winning their way to better things, all patiently anticipating the day when someone decides that it is safe to institute disease control. The illiterate villagers are apt to know, by virtue of having lived with their problem since time began, that they cannot meet the demands of education and improved economy without the hope of being healthy.



Epizootiology of Anthrax

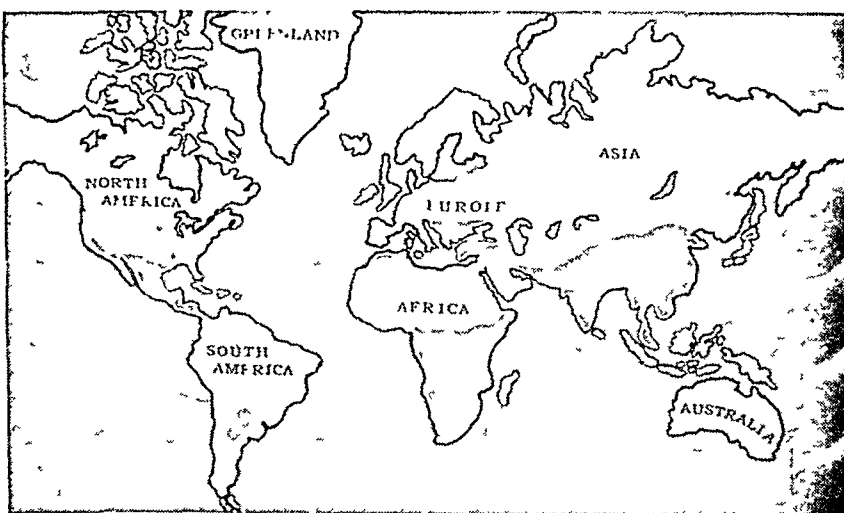
35 mm., sound, color, 9 minutes, 1952.

Audience: Veterinarians, practicing physicians, instructors and students in veterinary and medical schools, and public health personnel interested in anthrax.

Available: Loan—Communicable Disease Center, 50 Seventh Street, N. E., Atlanta, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

This film is designed as an aid in diagnosing and controlling anthrax, for centuries a killer of man and his domestic animals. Although modern antibiotics have contributed toward its control, it is still a serious problem to stockmen, veterinarians, and public health workers.

In depicting the epizootiology of anthrax, the film shows the cycle of infection and appearance of the spores of the etiological agent, *Bacillus anthracis*.



Anthrax occurs throughout the world. (Endemic areas indicated by shaded areas.)

lus anthracis. The case history of the spread, diagnosis, and final control of an epizootic of anthrax arising from an imported shipment of bonemeal which was contaminated with the spores of *B. anthracis* is included. Attention is called to the worldwide distribution of anthrax endemic areas, the susceptibility of

animals to the disease, the usual modes of infection, and the application of control measures.

The control of anthrax, the film points out, depends on early diagnosis followed by thorough sanitary measures and the constant vigilance and cooperation of stockmen, veterinarians, and public health officials.

Histoplasmin Sensitivity In Mississippi— A New Boundary

By ROBERT M. O'NEAL, M.D.

In northern Mississippi, infection with histoplasmosis is about three times as common as in the southern half of the State. This is especially true of the delta section in the northwest.

Results of a study to evaluate the significance of skin tests for systemic mycoses suggest that the northern part of Mississippi lies within the area of endemic histoplasmosis in the United States. The study more clearly defines the southern border of this area, which is usually described as the middle west or the Mississippi River Basin and as extending south through Tennessee. Mississippi to the south thus compares as a border State with Kansas to the west of the area of high prevalence, although the demarcation is more definite in Kansas. Christie (1) considered Mississippi a part of the endemic area when he reported high infection rates of over 55 percent whereas Palmer (2) considered the State to be south of the area of high prevalence.

Skin Test Reactions

In the present study, skin tests with histoplasmin, blastomycin, and coccidioidin were performed on 295 patients of the Mississippi State Sanatorium, the only tuberculosis sanatorium in Mississippi, during the period March 1951 to March 1952. Sixty-five of the group (22 percent) reacted positively to histoplasmin (see table).

In northern Mississippi, 31.5 percent of the patients tested were positive reactors to histoplasmin. In southern Mississippi, 12.8 percent

were positive. Only 0.7 percent (2 patients) reacted positively to blastomycin, and 0.7 percent reacted positively to coccidioidin.

Neither of the two positive reactors to blastomycin reacted to histoplasmin, but both reactors to coccidioidin had positive reactions to histoplasmin identical in size to the coccidioidin reactions. Both also gave a definite history of infection typical of coccidioidomycosis during residence in the San Joaquin Valley in California. The following statistical data, therefore, refer only to the histoplasmin test.

Geographic Variation

When all tests were plotted as to county of residence (see map), it was apparent that there was a significant geographic variation. County of residence was considered the one where patients had lived for 1 year prior to admission to the sanatorium.

For the purposes of the study, the State was divided into northern and southern Mississippi along an imaginary line at the Big Black River which flows east-west centrally into the Mississippi River. Below the Big Black River are the coastal plains. Above the river are the delta section of the northwest and the hills of northeastern Mississippi.

Of the 149 patients residing below the dividing line of the river, 19 (12.8 percent) were positive to histoplasmin. Above the river, 46 (31.5 percent) of the 146 persons tested were positive. This difference is statistically significant.

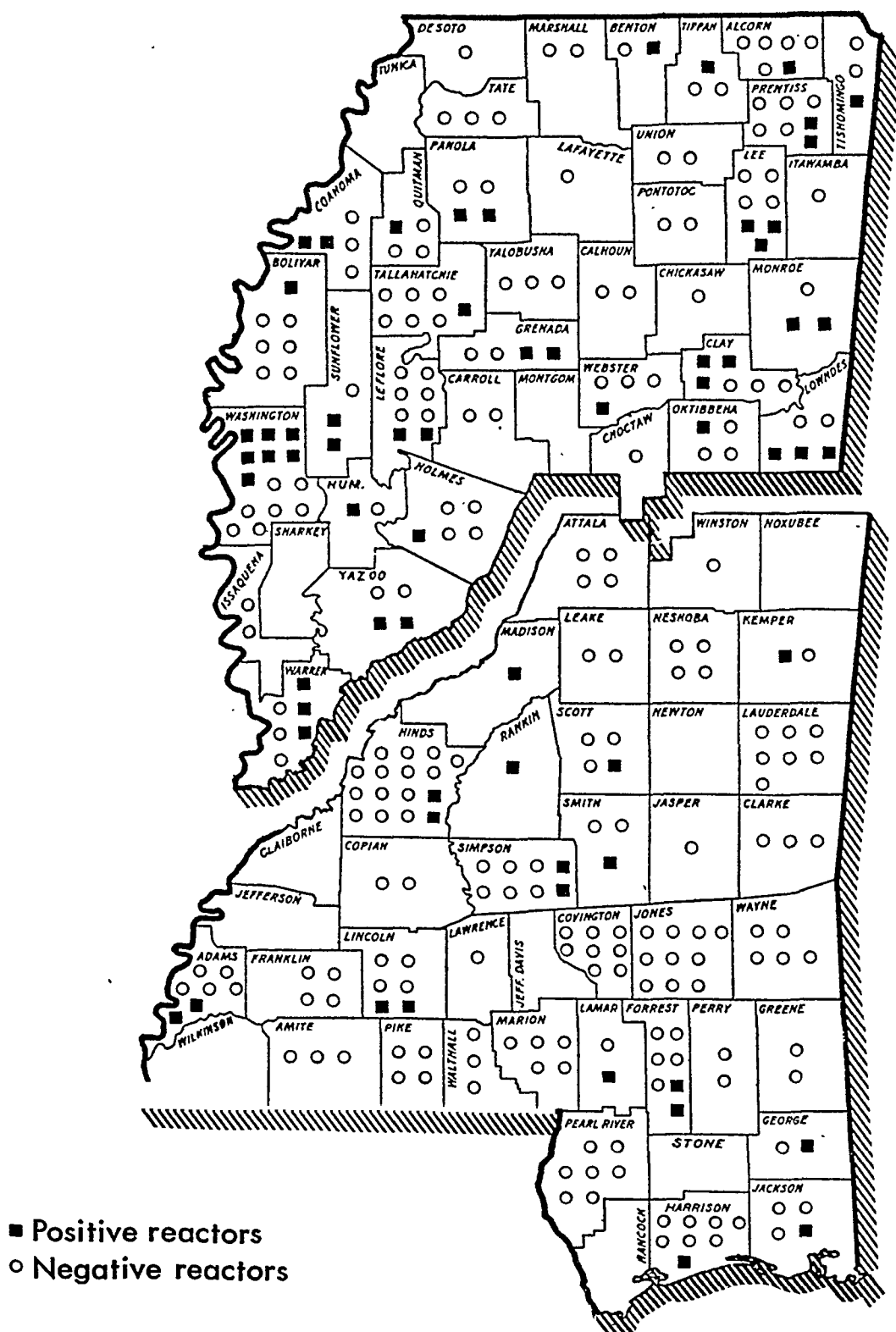
When the 13 counties in the delta section of northwestern Mississippi, the area of greatest prevalence, were considered apart from northern Mississippi, 61 tests were plotted for the area. Twenty-two (36.0 percent) were positive to histoplasmin. Our proven case of histoplasmosis (unreported) was from Bolivar County in the delta. It was not included in the skin tests because it was a diagnostic problem.

Materials and Methods

Blastomycin, coccidioidin, and histoplasmin concentrates were prepared each month in a sterile dilution of 1:1000 which was kept under refrigeration. New syringes were used and labeled for the respective antigens. One-tenth

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Geographic distribution of histoplasmin skin tests in northern and southern Mississippi



Results of histoplasmin skin tests in Mississippi

Item	Total	Sex		Race		Geographic division	
		Male	Female	White	Negro	Northern Mississippi	Southern Mississippi
Number of tests.....	295.0	127.0	168.0	207.0	88.0	146.0	149.0
Percentage of reactors.....	22.0	28.3	17.3	19.8	25.0	31.5	12.8
Standard deviation.....	2.41	4.00	2.92	2.77	4.62	3.84	2.74
Difference.....		11.0		5.2		18.7	

cubic centimeter of antigen was injected intradermally into the skin of the left forearm (histoplasmin), right forearm (blastomycin), and right upper arm (coccidioidin) simultaneously as suggested by Smith (3). Tests were read at 48 hours, and induration of 5 mm. or more was considered positive. Doubtful tests—there were only two—were considered negative.

The subjects were routine sanatorium admissions between 12 and 63 years, with an average age of 35.1 years. The age distribution in the northern and southern sections was not determined, and it is believed there could be little variance between the two samples. Age, however, was not considered in evaluating results because the percentage of histoplasmin sensitivity is highest in the young adult and middle age groups composing most sanatorium admissions (4, 5).

Critically ill patients were avoided because "critical illness exerts a depressing effect on skin sensitivity to tuberculin and histoplasmin" (6). Tests performed as diagnostic studies were excluded in an attempt to avoid sampling error.

Other Findings

Sex. Of the 127 men tested, 36 (28.3 percent) were positive to histoplasmin (see table). Of the 168 women, 29 (17.3 percent) were positive. This agrees with other studies which have determined that the rate of infection is slightly lower in women (5). The differences in this study are not statistically significant.

Race. Of the 207 white patients, 43 (19.8 percent) were positive. Of 88 Negro patients, 22 (25 percent) were positive. This differs from other studies in which the whites seemed to be more sensitive than the Negroes (5, 7), but the difference in rates is not statistically significant.

Statistical Significance

On the basis of the histoplasmin tests, the difference between the prevalence of reactors in northern Mississippi and those in the southern area is more than 2.5 times the standard deviation of the difference. Using this same level of significance, no significant difference between the Negro and white patients was demonstrated, and the difference between the sexes was of questionable significance.

NOTE: Blastomycin concentrate (B-8564) and histoplasmin concentrate (CT-189) were furnished by Eli Lilly & Co., Indianapolis. The coccidioidin (special dilution 1:10, lot 49028) was obtained from Cutter Laboratories, Berkeley, Calif.

ACKNOWLEDGMENT

Miss Margaret E. Rice, supervisor of public health statistics, Mississippi State Board of Health, assisted in analyzing the findings.

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Recipients of the Master's Degree In Sanitary Engineering

By WALTER A. LYON, M.S.S.E., and ARTHUR P. MILLER, C.E.

TO PERMIT a quantitative assessment of the present and future supply of trained sanitary engineers, it is necessary to determine the number of graduates who follow the profession. In an earlier report (1), such data were provided concerning graduates from undergraduate curricula and options in sanitary engineering. The present study is designed to provide similar information about those who have completed graduate work in sanitary engineering at the master's level.

In order to throw additional light on the place of graduate work in sanitary engineering education, certain other statistical data are also discussed. These relate to the undergraduate background, the amount of experience prior to entering graduate school, and the employment distribution of the graduates. Particular attention is given to characteristics that the graduates from individual schools have in common with respect to prior experience and choice of employment.

Method and Data Used

Miller (2) showed that 44 universities and colleges in the United States at some time dur-

ing the period 1899-1951 granted the master's degree to individuals majoring in sanitary engineering. From these, a group of 28 institutions was drawn. These schools granted the master's degree in sanitary engineering to 1,023 nationals of the United States during the period 1900-1951. This number of graduates, constituting 86 percent of all United States nationals receiving a master's degree in sanitary engineering during those 52 years (1900-1951), was used as the basic material for this study.

The universities and colleges in the group were divided into two subgroups: one consisting of those schools which, in our study, were represented by 30 or more respondents who were United States nationals and the other by those which had fewer than 30. In this way, 7 "heavy producers" (Harvard University, Johns Hopkins University, Massachusetts Institute of Technology, University of Michigan, New York University, University of North Carolina, and University of Wisconsin) and 21 "light producers" were selected in order that data might be provided for both classes of institutions. Although the number of heavy producers was somewhat disproportionate, the number of light producers which are included assures their representation. Wherever there were statistically significant differences between the characteristics of schools or between "heavy and light producers," these will be indicated as significant.

In the analysis of the data, tests for significance were used where the need for such a test arose. Wherever, in this report, a difference is indicated as being "significant," this means that the difference was significant at a level of $P=.05$. The test employed was that described by Zubin (4) which by the use of nomographs determines the significance of the differences between

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the relative frequencies of events in two contrasted series or groups.

The colleges and universities included in the study provided lists of their graduates and the best available mailing address for each one. An explanatory letter with a reply post card was sent to each person and followup action was taken as long as it appeared to be productive of results. The information given by each respondent was edited, coded, and entered on punch cards for mechanical tabulation. Usable

data were obtained from 874 individuals or 85.4 percent of the group (1,023) to whom cards were mailed. Those who had also earned doctorate degrees in sanitary engineering were excluded.

Table 1 shows a summary of the total number of master's degrees in sanitary engineering granted by the 28 schools in the sample, the number of respondents from each institution, and other information concerning the composition of the sample.

Table 1. Summary, as of 1951, of information on recipients of the master's degree in sanitary engineering from 28 colleges and universities, 1900-1951

Institution	Total ¹	Recipients of the master's degree						
		Nationals of other countries	Nationals of the United States					
			Total	Dead	Excluded ²	Respondents		
						Total	In profession	Out of profession
Total.....	1, 293	270	1, 023	21	128	874	763	111
Alabama Poly. Inst.....	3	0	3	0	1	2	1	1
California, Univ. of.....	31	1	30	0	8	22	18	4
Case Inst. of Tech.....	16	1	15	0	2	13	5	8
Cornell Univ.....	31	10	21	1	3	17	13	4
Florida, Univ. of.....	17	5	12	0	1	11	11	0
Harvard Univ.....	478	98	380	9	50	321	297	24
Illinois, Univ. of.....	13	2	11	0	1	10	10	0
Iowa State Col.....	11	1	10	0	2	8	5	3
Iowa, State Univ. of.....	18	6	12	0	0	12	10	2
Johns Hopkins Univ.....	48	8	40	0	3	37	36	1
Kentucky, Univ. of.....	3	0	3	0	0	3	3	0
Massachusetts Inst. of Tech.....	93	18	75	0	11	64	55	9
Michigan State Col.....	5	0	5	0	0	5	5	0
Michigan, Univ. of.....	200	67	133	6	11	116	99	17
New York Univ.....	102	1	101	1	13	87	75	12
North Carolina State Col.....	9	2	7	0	0	7	3	4
North Carolina, Univ. of.....	98	46	52	2	6	44	40	4
Northwestern Tech. Inst.....	3	0	3	0	1	2	1	1
Oklahoma Agri. and Mech. Col.....	3	0	3	0	0	3	3	0
Oregon State Col.....	5	0	5	0	1	4	3	1
Purdue Univ.....	16	1	15	0	3	12	11	1
Rensselaer Poly. Inst.....	3	0	3	0	1	2	2	0
Rutgers Univ.....	2	1	1	0	0	1	1	0
Tennessee, Univ. of.....	3	1	2	0	1	1	1	0
Texas, Univ. of.....	10	0	10	0	3	7	7	0
Virginia Poly. Inst.....	20	0	20	0	0	20	16	4
West Virginia Univ.....	3	0	3	0	0	3	3	0
Wisconsin, Univ. of.....	49	1	48	2	6	40	29	11

¹ See reference 2.

² Excluded because of no or insufficient information. In this group, there are 30 who also obtained a doctorate degree.

Schools and Their Graduates

The number of schools granting the master's degree in sanitary engineering has kept pace with the rapid increase in the number of such degrees awarded. Ten colleges were awarding the master's degree to individuals majoring in sanitary engineering by 1925; by 1935 the number had risen to 22, by 1945 to 32, and by 1951 to 44 with an additional 13 schools prepared to do so if candidates presented themselves.

The student load carried by the schools is not equally distributed. For example, of all the degrees granted during the last decade (1942-51), almost two-thirds were awarded by one-eighth of the schools active during that period.

Loss From the Profession

For the purpose of this study, a graduate was considered to have remained in the profession if, during the year 1951, he was in an occupation in which he devoted all or part of his time to the application of engineering knowledge in the control of the environment in order to promote and protect the public health in administrative, promotional, operational, teaching, testing, design, or research activities.

In the bachelor's level study (1), all those who spent 50 percent or more of their time in sanitary engineering work were classified as being in the profession. In this study, all those who were practicing sanitary engineering any portion of their time were so classified. This change in definition accounts for 8 of the 35.8 percent difference between the "percents remaining in the profession" when the bachelor's and the master's groups are compared.

As stated before, the total number of students from the schools in the sample from whom usable information was received was 874; of these, 763 or 87.3 percent remained in the profession in 1951.

If we compare the percents remaining in the three educational levels, we find the following distribution:

*Percent of graduates
remaining*

<i>Degree level of graduates</i>	<i>in the profession</i>
Bachelor's-----	51.5
Master's-----	87.3
Doctorate-----	97.3

The figures above are based on degrees granted rather than on individuals. The same person may have been included twice or even three times. (The number of doctorate degrees earned in sanitary engineering to date is relatively small; therefore, data on them are used in this study only in this one comparison.) Most of those who received doctorates had also received the master's degree in sanitary engineering. This is not true, however, for those who earned degrees only to the master's level. Only about one-third of these had studied sanitary engineering at the undergraduate level.

The difference in percents remaining between the bachelor's and the master's degree levels even after taking into consideration the 8 percent accounted for through change in definition previously mentioned is about three times as great as the difference between the master's and the doctorate levels. The difference in percents remaining between the bachelor's and the master's levels is probably due in part to the fact that most of the master's degrees were granted more recently than most of the bachelor's degrees. The median master's degree in the sample used in this study (1900-1951) was granted in 1947. The median bachelor's degree in the undergraduate study (1) (1910-49) was granted in 1937. This means that the median bachelor's level graduate has had more time (that is, more of a chance) to leave the profession than has the median master's degree recipient.

In comparing the percents of graduates from each school who have remained in the profession, only the graduates during the 1942-51 period were considered, because a number of the schools in the study did not begin to grant the master's degree in sanitary engineering until some time during that period.

As shown in table 6, there were relatively small differences in the percents remaining among those from each school. In some cases, the number of graduates involved was too small to permit drawing significant conclusions.

When the heavy producers during the 1942-51 period were compared with the light producers, a significant difference in the percents remaining was found. (Since, for the 1942-51 period, the line of division between heavy and light producers was drawn at 15 respond-

ents, the University of California is included for this period only among the heavy producers.) For the heavy producers, the percent remaining was 93.5, whereas for the light producers it was 84.7. The reasons for this difference will become more obvious in the discussions of pregraduate-school experience and type of employment which follow.

Undergraduate Background

The undergraduate background of about half of the master's degree recipients in sanitary engineering was the civil engineering curriculum; somewhat more than a third completed the sanitary engineering option of civil engineering or the sanitary engineering curriculum; and about one-sixth completed some other type of engineering curriculum. Table 2 shows this, the percents remaining, and the percents which had pregraduate-school experience for each type of undergraduate work.

Table 2 also shows that increasing percents of the master's degree recipients who had undergraduate work in civil engineering, the sanitary engineering option of civil engineering, sanitary or public health engineering, and other types of engineering curricula, remained in the profession. The percents who have had 1 year

or more of pregraduate-school experience vary in the same order. The differences in these percents are small, but they follow a pattern which suggests the general rule that the more a man is exposed to sanitary engineering either via experience or education, the more likely he is to remain in the profession.

Experience Prior to Graduate Work

Many of those who earned the master's degree in sanitary engineering had gained some experience in the field before beginning graduate work. In this study, we have assumed that only those who have had 1 year or more of such pregraduate-school sanitary engineering experience have had a significant amount of such experience. Table 3 indicates that more than half of the master's degree recipients fall into that category.

About 57 percent of those who remained in the profession after having completed graduate school work, had a year or more of pregraduate-school experience whereas only 24 percent of those who left the field had such experience. This is, of course, to be expected since an engineer who had some pregraduate-school experience has had more chance to decide whether or not he likes sanitary engineering than one who has not. Actually, of the 874 graduates in the sample, only 27 or 3 percent who had had pregraduate-school experience, left the profession at some time subsequent to the completion of graduate work.

When the graduates are grouped by the type of their 1951 employment, there are considerable differences in the proportions who had pregraduate-school experience. Table 4 demonstrates this.

The second column of this table shows the percents of all sanitary engineers in each type of employment who have reached the master's level of education. This could be considered as an indication of the extent of utilization of master's level men in each employment category. The fourth column shows the percents of graduates in each employment category who have had a year or more of pregraduate-school experience. This may be considered an index of the opportunity given by the employer, or taken by the student, to return to school for graduate work.

Table 2. Distribution of type of undergraduate curriculum completed by percent remaining in the profession in 1951 and pregraduate-school experience in sanitary engineering

Undergraduate curriculum completed	Recipients of the master's degree			
	Total		Percent remaining in the profession in 1951	Percent with 1 year or more of pregraduate-school experience
	Number	Percent		
Total.....	874	100. 0	87. 3	52. 5
Civil engineering.....	421	48. 2	86. 2	46. 3
Civil engineering-sanitary engineering option.....	266	30. 4	86. 8	53. 8
Sanitary or public health engineering.....	38	4. 3	89. 5	60. 5
Other engineering.....	149	17. 1	90. 6	65. 8

Table 3. Distribution of years of sanitary engineering experience gained prior to entering graduate school and percent remaining in the profession in 1951

Years of pregraduate-school experience in sanitary engi- neering	Status of recipients of the master's degree in 1951						Percent remaining in the pro- fession
	Total		In sanitary engineer- ing work		Out of sanitary engi- neering work		
	Number	Percent	Number	Percent	Number	Percent	
Total.....	874	100. 0	763	100. 0	111	100. 0	87. 3
Less than 1.....	415	47. 5	331	43. 4	84	75. 7	79. 8
1 to 4.9.....	255	29. 2	232	30. 4	23	20. 7	91. 0
5 to 9.9.....	126	14. 4	123	16. 1	3	2. 7	97. 6
10 to 14.9.....	57	6. 5	56	7. 3	1	. 9	98. 3
15 to 19.9.....	17	1. 9	17	2. 2	0	-----	100. 0
20 and over.....	4	. 5	4	. 5	0	-----	100. 0

¹ Because of rounding, details may not add to totals in this and all subsequent tables.

Since the majority earned their degrees rather recently, it is assumed that most of the graduates have remained in the same employment category in which they were prior to their graduate studies.

As a general rule, in those employment categories where the greatest use of master's level men has been made, a greater proportion of the

men have returned to school to earn such a degree. However, there seem to be two exceptions to this rule. In the case of public works agencies where only a small proportion of sanitary engineers hold a master's degree, a high proportion have obtained them by returning to school after working in the field. With academic institutions, the opposite appears to be

Table 4. Relationship between type of employment and pregraduate-school experience in sanitary engineering

Type of employment	Percent of all practicing sanitary engineers with a master's degree of any type ¹	Recipients of the master's degree in sanitary engineering		
		Number	Percent with 1 year or more of pregraduate-school experience	Median number of years of pregraduate-school experience
Total.....	-----	874	52.5	1.35
In sanitary engineering work.....	21.3	763	56.6	1.88
Public health agency.....	35.8	345	68.1	3.32
Public works agency.....	11.2	66	59.1	2.33
Utility company.....	12.1	3	66.6	2.00
Academic institution.....	52.7	97	51.5	1.26
Special agency ²	24.4	40	50.0	1.00
Public administration.....	10.8	6	50.0	1.00
Construction firm.....	(³)	16	50.0	1.00
Industrial concern.....	18.6	69	42.0	.88
Consulting firm.....	12.9	107	34.6	.77
Other.....	11.7	14	64.3	2.14
Out of sanitary engineering work.....	-----	111	24.3	.66

¹ See reference 3.

² Includes professional associations, nongovernmental agencies, and military service.

³ Included under "Other."

the case. Although a high proportion of educators and researchers hold the master's degree, relatively fewer of them gained experience before earning their degree. In some of the employment categories, the numbers involved were too small to produce significant information.

Sanitary engineers who return to school to earn their master's degree after having gained some experience seem to favor certain schools. The data show that significantly greater percentages of graduates from Harvard University and the University of Michigan have had more than 1 year of pregraduate-school experience. This also appeared to be the case (although not statistically significant) for the Johns Hopkins University, New York University, and the University of North Carolina. Conversely, a significantly smaller percent of the graduates from the University of Wisconsin and the Massachusetts Institute of Technology have had such experience. When the heavy producers are compared to the light producers, 57 percent of the graduates from the former are found to have had more than 1 year of pregraduate-school experience as compared to 30 percent of the graduates from the latter. This difference is significant.

Time Spent in Sanitary Engineering

Because of the nature of sanitary engineering and particularly because of its relation to other types of public works, there are a number of graduates who spend only a portion of their time in sanitary engineering. This is particularly true for sanitary engineers who have reached a higher level of responsibility, such as the head of a large consulting firm, a city engineer, or the dean of a school of engineering. Table 5 shows this distribution, and compares it with that of the entire profession.

Four-fifths of the master's degree recipients in the sanitary engineering profession devoted most of their time to sanitary engineering work. When compared with the entire profession, the recipients of master's degrees in sanitary engineering devote considerably more of their time to work in sanitary engineering than do non-recipients. This is probably so in part because the master's group is younger and because a greater proportion of this group is in public

Table 5. Distribution of all sanitary engineers and of recipients of the master's degree by percent of time spent in sanitary engineering work

Group	Percent of time devoted to sanitary engineering work	All sanitary engineers ¹	Recipients of the master's degree in sanitary engineering	
		Percent	Number	Percent
	Total-----	100. 0	763	100. 0
I	More than 75-----	61. 9	611	80. 1
II	50 to 75-----	19. 2	82	10. 7
III	Less than 50-----	18. 9	70	9. 2

¹ See reference 3.

health work as compared with the profession as a whole.

When we study the graduates from chronologically selected groups of classes, we find noteworthy differences in the percents remaining in, and in the distribution of percent of time spent on, sanitary engineering work.

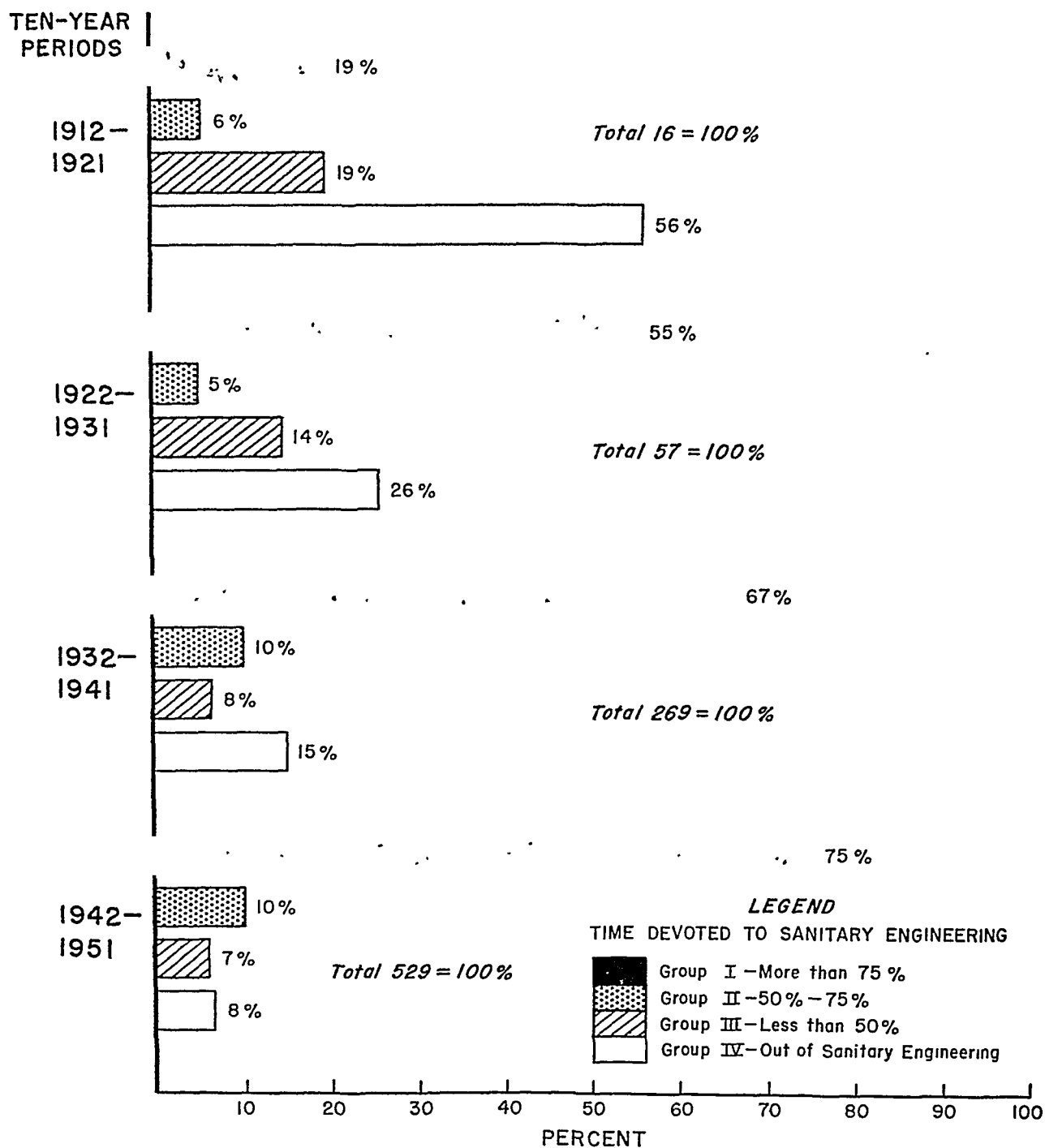
Figure 1 shows that the greater the time elapsed since graduation, the larger becomes the proportion of those who have left the profession. The high percentage of graduates from the 1912-21 classes who have left the profession is no doubt due in part to retirement. The progressive increase in the size of group I among the more recent graduates is probably due to the fact that younger men tend to work in more specialized areas and in part due to the recent expansion of environmental health activities in water pollution control and other fields.

How much of this change is due to program growth and how much of it can be attributed to the natural broadening of individual responsibility that comes with advancing professional experience can only be determined by periodic studies of this kind which will compare future observations with present findings.

Employment Distribution

The types of employment favored by graduates of different colleges and universities appear to differ. To determine the extent of these differences, the graduates who have remained in

Figure 1. Percentage distribution of recipients of a master's degree for selected 10-year periods, by time devoted to sanitary engineering work in 1951.



the profession from each heavy producer school were compared in each case with the graduates from all the remaining schools combined by the type of employment in which they were found in 1951. It was possible to make these comparisons only for the heavy producers, as only they

had graduates in sufficient numbers to justify significant conclusions.

Table 6 gives the employment information as of 1951 for the graduates of each of the 28 schools in the sample who were then in the profession.

Table 6. Recipients of the master's degree in the profession in 1951, by institution and type of employment; and the percent remaining in the profession of the class group of 1942-51

Institution at which the master's degree was earned	Classes of 1900-1951											
	Total		Public health agency		Public works agency		Utility company		Consulting firm		Industrial concern	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total.....	763	100	345	45.2	66	8.7	3	0.4	107	14.0	69	9.0
Alabama Poly. Inst.....	1	100	0	-----	0	-----	0	-----	0	-----	0	-----
California, Univ. of.....	18	100	10	55.6	1	5.6	0	-----	1	5.6	1	5.6
Case Inst. of Tech.....	5	100	1	20.0	0	-----	0	-----	3	60.0	1	20.0
Cornell Univ.....	13	100	5	38.5	1	7.7	0	-----	2	15.4	1	7.7
Florida, Univ. of.....	11	100	5	45.5	1	9.1	0	-----	0	-----	0	-----
Harvard Univ.....	297	100	160	53.9	17	5.7	0	-----	38	12.8	30	10.1
Illinois, Univ. of.....	10	100	3	30.0	0	-----	0	-----	1	10.0	1	10.0
Iowa State Col.....	5	100	0	-----	0	-----	0	-----	1	20.0	1	20.0
Iowa, State Univ. of.....	10	100	2	20.0	2	20.0	0	-----	1	10.0	2	20.0
Johns Hopkins Univ.....	36	100	16	44.4	6	16.7	0	-----	1	2.8	1	2.8
Kentucky, Univ. of.....	3	100	1	33.3	0	-----	0	-----	2	66.6	0	-----
Massachusetts Inst. of Tech.....	55	100	13	23.6	3	5.5	0	-----	15	27.3	6	10.9
Michigan State Col.....	5	100	0	-----	0	-----	0	-----	0	-----	1	20.0
Michigan, Univ. of.....	99	100	69	69.7	10	10.1	1	1.0	6	6.1	2	2.0
New York Univ.....	75	100	15	20.0	15	20.0	1	1.3	18	24.0	15	20.0
North Carolina State Col.....	3	100	1	33.3	0	-----	1	33.3	0	-----	0	-----
North Carolina, Univ. of.....	40	100	18	45.0	2	5.0	0	-----	8	20.0	2	5.0
Northwestern Tech. Inst.....	1	100	0	-----	0	-----	0	-----	1	100.0	0	-----
Oklahoma Agri. and Mech. Col.....	3	100	1	33.3	0	-----	0	-----	0	-----	1	33.3
Oregon State Col.....	3	100	0	-----	1	33.3	0	-----	0	-----	0	-----
Purdue Univ.....	11	100	5	45.5	2	18.2	0	-----	1	9.1	0	-----
Rensselaer Poly. Inst.....	2	100	1	50.0	0	-----	0	-----	0	-----	0	-----
Rutgers Univ.....	1	100	0	-----	0	-----	0	-----	0	-----	0	-----
Tennessee, Univ. of.....	1	100	0	-----	1	100.0	0	-----	0	-----	0	-----
Texas, Univ. of.....	7	100	3	42.9	2	28.6	0	-----	1	14.3	0	-----
Virginia Poly. Inst.....	16	100	5	31.3	1	6.3	0	-----	2	12.5	1	6.3
West Virginia Univ.....	3	100	1	33.3	0	-----	0	-----	0	-----	0	-----
Wisconsin, Univ. of.....	29	100	10	34.5	1	3.4	0	-----	5	17.2	3	10.3

See footnotes at end of table.

Harvard University, when compared to all other schools combined, has a significantly greater proportion of its graduates working for public health agencies and a significantly smaller proportion employed in public works agencies. Harvard also appears to have a smaller proportion of its graduates who have reached only the master's level serving as university teachers, although more than half of the Harvard doctorate recipients are now working in academic institutions.

Graduates from the University of Michigan also seem to choose, in smaller proportions

than do graduates from the other schools combined, employment with consulting firms, industrial concerns, and academic institutions.

The picture among the graduates from New York University is somewhat reversed from that of the University of Michigan. Significantly smaller proportions are in public health and academic work, while significantly greater proportions are in public works agencies, consulting firms, and industrial concerns.

When the Massachusetts Institute of Technology was compared with all the other schools, it was found that a significantly small percent

Table 6. Recipients of the master's degree in the profession in 1951, by institution and type of employment; and the percent remaining in the profession of the class group of 1942-51—Continued

Institution at which the master's degree was earned	Classes of 1900-1951										Classes of 1942-51
	Academic institution		Special agency ¹		Public administration		Construction firm		Other		Remaining in the profession in 1951
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Percent
Total.....	97	12.7	40	5.2	6	0.8	16	2.1	14	1.8	91.9
Alabama Poly. Inst.....	0	-----	0	-----	0	-----	1	100.0	0	-----	100.0
California, Univ. of.....	4	22.2	0	-----	0	-----	1	5.6	0	-----	90.0
Case Inst. of Tech.....	0	-----	0	-----	0	-----	0	-----	0	-----	36.4
Cornell Univ.....	3	23.1	0	-----	0	-----	1	7.7	0	-----	85.7
Florida, Univ. of.....	4	36.4	1	9.1	0	-----	0	-----	0	-----	100.0
Harvard Univ.....	24	8.1	10	3.4	1	.3	5	1.7	12	4.0	94.4
Illinois, Univ. of.....	4	40.0	1	10.0	0	-----	0	-----	0	-----	100.0
Iowa State Col.....	3	60.0	0	-----	0	-----	0	-----	0	-----	66.7
Iowa, State Univ. of.....	3	30.0	0	-----	0	-----	0	-----	0	-----	80.0
Johns Hopkins Univ.....	3	8.3	8	22.2	0	-----	1	2.8	0	-----	97.2
Kentucky, Univ. of.....	0	-----	0	-----	0	-----	0	-----	0	-----	100.0
Massachusetts Inst. of Tech.....	11	20.0	3	5.5	2	3.6	1	1.8	1	1.8	97.6
Michigan State Col.....	4	80.0	0	-----	0	-----	0	-----	0	-----	100.0
Michigan, Univ. of.....	5	5.1	4	4.0	0	-----	2	2.0	0	-----	95.2
New York Univ.....	3	4.0	7	9.3	0	-----	1	1.3	0	-----	87.9
North Carolina State Col.....	1	33.3	0	-----	0	-----	0	-----	0	-----	66.7
North Carolina, Univ. of.....	5	12.5	3	7.5	1	2.5	0	-----	1	2.5	96.7
Northwestern Tech. Inst.....	0	-----	0	-----	0	-----	0	-----	0	-----	50.0
Oklahoma Agri. and Mech. Col.....	1	33.3	0	-----	0	-----	0	-----	0	-----	100.0
Oregon State Col.....	2	66.6	0	-----	0	-----	0	-----	0	-----	100.0
Purdue Univ.....	1	9.1	2	18.2	0	-----	0	-----	0	-----	91.7
Rensselaer Poly. Inst.....	1	50.0	0	-----	0	-----	0	-----	0	-----	100.0
Rutgers Univ.....	1	100.0	0	-----	0	-----	0	-----	0	-----	(²)
Tennessee, Univ. of.....	0	-----	0	-----	0	-----	0	-----	0	-----	100.0
Texas, Univ. of.....	1	14.3	0	-----	0	-----	0	-----	0	-----	100.0
Virginia Poly. Inst.....	4	25.0	1	6.3	1	6.3	1	6.3	0	-----	83.3
West Virginia Univ.....	1	33.3	0	-----	1	33.3	0	-----	0	-----	(²)
Wisconsin, Univ. of.....	8	27.6	0	-----	0	-----	2	6.9	0	-----	77.8

¹ Includes professional associations, nongovernmental agencies, and military service.

² No master's degree in sanitary engineering granted in the 1942-51 period.

of its graduates are in public health agencies and a significantly greater percent with consulting firms. MIT graduates also appear to favor employment in academic institutions.

The employment distribution of the graduates from the University of North Carolina appears to fall closer to the average than that of the other heavy producers. There were no significant differences in the employment distribution of its graduates when they were compared with those of the other schools.

Graduates from the Johns Hopkins University showed an employment distribution fairly

close to the average except that they favor public works agencies somewhat and are represented in a significantly smaller proportion in consulting firms.

The University of Wisconsin is the only school which has a significantly higher proportion of its graduates employed in academic institutions.

When heavy and light producers were compared, a few differences were found in the employment distribution of the graduates from the two groups of schools. The heavy producers had a significantly higher proportion of their

graduates employed in public health agencies and the light producers had almost three times as great a proportion of their graduates employed in academic institutions as did the heavy producers. As a matter of fact, more than half of those employed in the academic field came from the light producers and, interestingly enough, the University of Wisconsin, which produced the least number of graduates among the heavy producers, also had a high percentage of its graduates teaching.

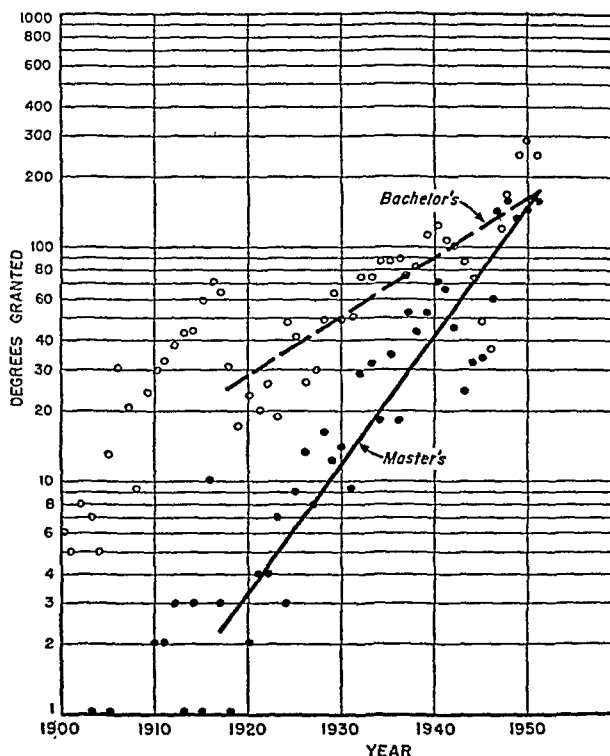
If these data are pursued further, it becomes evident that only a small proportion (15.3 percent) of the master's degree recipients from the heavy producers who are now in the academic field, are teaching at the same institution that awarded them their master's degrees. But of more importance, these data also reveal that the light producers not only turn out a disproportionate share of teachers, but that the majority of these teachers (64.3 percent) have remained with the same institution from which they earned graduate degrees. It is likely that the Engineer's Council for Professional Development (see its 19th annual report, 1951) had this in mind when it wrote: "As schools grow, the pressure for staff expansion led to recruiting by the simple process of keeping on recent graduates, and then allowing them to do their graduate work, if any, while teaching. In this way, there was a subtle influence of continuity of curriculum with little urge for reevaluation or vitality of concept of objectives."

Growing Importance of the Master's Degree

While there has been a considerable increase in the number of sanitary engineering degrees granted on all levels, the number of master's degrees has increased at a greater rate than the number of bachelor's degrees.

The total number of master's and bachelor's degrees granted to students majoring in sanitary engineering in the United States each year during the period 1900-1951 are shown in figure 2. The points on this figure have been plotted on a logarithmic vertical scale in order to facilitate the comparison of relative differences. Between the years 1917 and 1941, the data appear to assume a certain degree of linearity (see note on page 727).

Figure 2. Total number of bachelor's degrees and of master's degrees granted upon completion of study in sanitary engineering in the United States each year, 1900-1951.



The figure shows that the average rate of increase in the annual number of master's degrees granted has been considerably greater than that of the bachelor's degrees. The two curves intersect during 1951. This is, of course, not true for the entire engineering field.

Although there is no evidence that sanitary engineering education on the undergraduate level is on the decline, there is a definite shift of emphasis toward graduate level education in this field. Educational opportunities for veterans have undoubtedly been partly responsible for this shift.

Future trends in a field as small as this are difficult to predict. Recent estimates (1) of the expected number of graduates from the bachelor's level appear now to have been somewhat low. This is because the estimates of future production of all engineering graduates were recently raised, presumably because of the effect of the recent publicity on the shortage of engineering manpower. It looks now as though we might expect between 500 and 600 sanitary engineering graduates at the bachelor's level

NOTE: When a straight line is fitted to the points by the method of least squares for the period 1917-51 (see fig. 2 and p. 726 of text), the mathematical expressions for the best fitting lines became:

$$\text{Log } Y_{cb} = 1.77780 + .02777x \text{ for the bachelor's degrees and}$$

$$\text{Log } Y_{cm} = 1.28388 + .05654x \text{ for the master's degrees.}$$

x equals the year minus 1934 during which Y_c degrees were granted. The year 1934 was chosen as the origin for the x-axis.

during the 4-year period, 1953-56. Figure 2 indicates that if the 34-year (1918-51) trend continues, the annual number of master's degrees granted may be expected to exceed the number of bachelor's degrees.

The availability of public, philanthropic, and other funds for graduate education, as well as selective service policies and general economic trends, are each likely to have an impact upon the number of men who will be able to earn master's degrees in sanitary engineering in the years to come. No matter what outside forces might introduce unexpected change, the record of the past 34 years clearly shows the profession's increasing preference for graduate training in the structure of sanitary engineering education.

Summary

A quantitative study has been made of those who received master's degrees in sanitary engineering during the 52-year period 1900-1951. Twenty-eight colleges and universities, whose graduates represent 86 percent of all the United States nationals who received master's degrees in sanitary engineering during that period, were included in the study. Upon inquiry, 85.4 percent of these graduates responded with usable data.

It was found that 87.3 percent of the master's degree recipients were in the profession in 1951.

The median master's degree recipient gained 1.35 years of sanitary engineering experience after receiving his bachelor's degree and before beginning his graduate studies. Of the entire group, only 3 percent who had had pregraduate-school experience, left the profession at some time subsequent to doing graduate work.

Among the master's degree recipients reporting, 83.6 percent earned their degrees at 7 of the schools (heavy producers) and 16.4 percent, at the other 21 schools (light producers). A significantly greater proportion of graduates from the heavy producers than from the light producers were practicing sanitary engineering in 1951.

The patterns of employment distribution of the graduates from certain individual schools and from the heavy and the light producer groups differ in part significantly from each other. Particularly outstanding is the fact that more than half of those in the academic field have received their degrees from the light producers and almost two-thirds of them are employed at the institution in which they received their master's degree.

Slightly more than one-third of those who received the master's degree in sanitary engineering had a sanitary engineering undergraduate education. About half took the civil engineering curriculum and one-sixth had completed undergraduate work in one of the other branches of engineering.

The relative trends in the production of bachelor's and master's level graduates in sanitary engineering over the past 34 years suggest that the point has been reached at which the annual production of master's level graduates can be expected to exceed that of the bachelor's level graduates. This observation, together with the fact that roughly 8 out of 10 master's degree recipients as compared with 5 out of 10 bachelor's degree recipients, stay in the profession for which they received their schooling suggests that the educational needs of the profession are being more successfully met by graduate-level education.

ACKNOWLEDGMENT

The authors are appreciative of the advice on statistical problems given by Theodore D. Woolsey, biostatistician, Division of Public Health Methods, Public Health Service.

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Public Health Service Staff Announcements

Dr. Russell M. Wilder, first director of the National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Public Health Service, retired July 1, 1953. Dr. Wilder, internationally known for his work in metabolic diseases and nutrition, came to the Public Health Service in January 1951 shortly after his retirement from the Mayo Foundation where he was professor of medicine and chief of the department of medicine. He will continue as a member of the Board of Editors of *Public Health Reports*. Dr. Wilder will make his home at Rochester, Minn.

Dr. Eddie M. Gordon has been appointed medical officer in charge of the Public Health Service Hospital (National Leprosarium), Carville, La., to succeed Dr. Frederick A. Johansen. Dr. Gordon has been in charge of the Public Health Service Hospital in Chicago. He has also held clinical positions at the Service medical facilities in San Francisco, Boston, Seattle, and

San Pedro, and has been assigned medical officer in the U. S. Consulates at Hong Kong, China, and Manila, P. I.

Dr. Frederick A. Johansen, who retired June 1 after 29 years of service at Carville, participated actively in the evolution of the modern sulfone therapy. Later he guided the installation and organization of the community activities and rehabilitation services at the National Leprosarium. He is widely recognized as an authority on Hansen's disease.

Octavia Heistad, Public Health Service nurse officer, has been assigned to the Point IV technical aid program in Libya where she will work with Libyan nurses and other health aides in extending public health nursing. Miss Heistad, who has done public health nursing in Chicago and Detroit for the past 4 years, will join Bertha Tiber, assigned to Libya as chief nurse under Point IV.



Rapid Method For Distilling Fluorides From Water Samples

By R. E. FRAZIER and H. G. OLDFIELD, M.S.

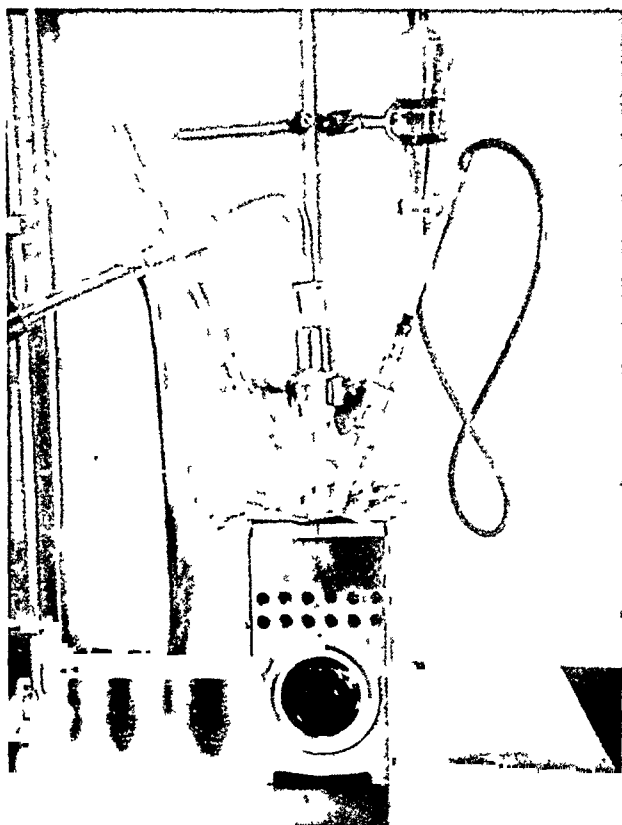
Distillation of fluorides from water samples, when concentration of the sample is unnecessary, may be made in less than 30 minutes, one-third of the time required for distillation by the standard method, by simply introducing the sample itself at a slow constant rate into a mixture of water and sulfuric acid kept boiling at a temperature of 140° C. Where frequent fluoride distillations are required, the timesaving features of this method make it particularly useful.

The method described here evolved from the logical supposition that with a constant distillation rate and temperature and with fluoride entering the flask in the sample water and leaving the flask in the distillate, the concentration of the fluoride in the distillate would eventually be the same as the concentration in the sample. The rate of distillation might have a slight effect on the point at which equilibrium is attained, but equilibrium must be reached at some point as long as the rate is constant.

Distilling Apparatus

The distilling apparatus used in the experimental work to be described is shown in the accompanying illustration. The flask is a 500-ml. three-necked boiling flask fitted with a thermometer which extends into the liquid being distilled. The sample lead-in tube is a 0.1-ml. pipette connected to a separatory funnel by a length of rubber tubing and fitted into one neck of the flask by means of a rubber sleeve. All other joints are standard taper glass. The separatory funnel has a notched stopcock for

Mr. Frazier is chief and Mr. Oldfield is bacteriologist of the engineering laboratories section, division of environmental sanitation, Minnesota Department of Health.



Distillation apparatus used in experimental work on rapid method for distilling fluorides.

easy control of flow at slow rates; a glass tube fitted in a rubber stopper reaches nearly to the bottom of the funnel to provide a constant head of liquid. The heating unit is a 750-watt heater with transformer control.

Procedure

The flask is charged with 15 ml. of sulfuric acid, glass beads, a small amount of silver sulfate, and sufficient water to give a boiling point of 138° to 140° C.

In making a distillation, the sample is introduced at a rate sufficient to maintain a temperature of 138° to 140° C. with the heating unit set at full capacity. With the apparatus described, distillation proceeds at the rate of approximately 7 ml. per minute. All tests described below are based on a distillation rate of 7 ml. per minute at 138° to 140° C.

At the end of one distillation, the excess sample in the separatory funnel is discarded and a new sample introduced, the lead-in tube to the flask being removed and flushed with the new

sample. The separatory funnel and lead-in tube are again placed in position, and the distillation is restarted. The acid charge in the flask may be used repeatedly. As many as 20 distillations from one batch of acid have been made with no apparent difficulty. The frequency of acid renewal should probably depend upon the mineral and organic-matter content of the water analyzed.

Equilibrium Studies

Preliminary experiments were made with a known concentration of fluoride in distilled water in order to determine how rapidly equilibrium between input and output would be established. One hundred milliliters of distilled water were distilled through the apparatus and discarded. Then a solution containing 2 ppm fluoride was distilled, and five 50-ml. portions were collected. Distillation of the fluoride solution was discontinued and distilled water substituted, five 50-ml. portions again being collected.

The fluoride content of the portions collected and of all subsequent samples described in this report was determined by the Sanchis method, modified by Scott, as outlined in "Standard Methods for the Examination of Water and Sewage," ninth edition. Analysis of these samples gave the results in table 1, which indicate that for routine work distillation of 50 ml. to waste at the beginning of each new sample should be sufficient.

In order to determine whether or not equi-

Table 1. Recovery of fluoride in successive 50-ml. portions

Portion No.	Concentration in feed (ppm)	Concentration in recovered distillate (ppm)
1-----	2	1.5
2-----	2	2
3-----	2	2
4-----	2	2
5-----	2	2
6-----	0	.7
7-----	0	.02
8-----	0	Trace
9-----	0	0
10-----	0	0

librium would be established at a similar rate with tapwater, fluoride was added to Minneapolis tapwater at the rate of 1.5 ppm. The apparatus was cleared of fluorides by distilling 300 ml. of distilled water through it. Then distillation of the fortified Minneapolis water was started, and four consecutive 50-ml. portions were collected. Results of the analysis of these portions, shown below, again indicate that for routine work a sufficiently adequate equilibrium is established after the distillation of 50 ml. to waste.

Portion No.	Concentration in recovered distillate (ppm)
1-----	1.00
2-----	1.56
3-----	1.58
4-----	1.59

Another series of experiments was made with Minneapolis tapwater to determine whether or not the distillation of 50 ml. to waste before collecting a sample would be sufficient for samples with a higher fluoride concentration. After the apparatus was cleared with distilled water, four successive 50-ml. portions were collected from distillate of Minneapolis tapwater containing 5 ppm added fluoride. Results of the analysis of these portions, shown below, indicate that equilibrium is established at approximately equal rates for samples containing about 1.5 ppm and 5 ppm fluoride.

Portion No.	Concentration in recovered distillate (ppm)
1-----	3.75
2-----	4.80
3-----	5.0
4-----	5.0

Accuracy Tests

Further experiments with tapwater were made to determine the general accuracy of the procedure as it would actually be used. Samples of Minneapolis tapwater containing 1.5 ppm added fluoride were alternated with samples of Minneapolis tapwater containing only the naturally occurring fluorides, 50 ml. of distillate being discarded at the beginning of each change. Both the distilled samples and the undistilled samples were analyzed by the standard method. Results of these tests, shown

Table 2. Recovery of fluoride from Minneapolis water—normal and fortified samples

Portion No.	Fluoride added (ppm)	Fluoride recovered (ppm)	
		Distilled	Not distilled
1 ¹ -----	0	0.11	0.15
2-----	0	.12	-----
3-----	0	.11	-----
4 ¹ -----	1.5	1.58	1.6
5 ¹ -----	0	.10	-----
6 ¹ -----	1.5	1.54	-----
7 ¹ -----	0	.13	-----
8 ¹ -----	1.5	1.56	-----

¹ 50 ml. of distillate discarded before collecting sample.

in table 2, indicate that the technique is sufficiently accurate for routine work.

Other Substances Added

It has been reported that aluminum may cause irregularity in the recovery of fluorides by distillation. Although waters in Minnesota usually contain less than 0.5 ppm aluminum, it was decided to investigate the effect of added aluminum. Test solutions were made by adding 1.5 ppm of fluoride and 10 ppm of aluminum to Minneapolis tapwater. Two hundred and fifty milliliters of this solution were distilled, the first 50 ml. being discarded and two successive 100-ml. portions collected. Then, 250 ml. of Minneapolis water containing 1.5 ppm of added fluoride were distilled, the first 50 ml. again being discarded and two 100-ml. portions col-

Table 3. Fluoride recovery from Minneapolis water in presence of aluminum

Portion No.	Aluminum added (ppm)	Fluoride added (ppm)	Fluoride recovered (ppm)
1 ¹ -----	0	1.5	1.56
2 ¹ -----	10	1.5	1.56
3-----	10	1.5	1.58
4 ¹ -----	0	1.5	1.60
5-----	0	1.5	1.54

¹ 50 ml. of distillate discarded before collecting sample.

lected. The results of the analysis of these samples are tabulated in table 3. There appears to be little or no effect on fluoride recovery either during the time the aluminum was being added or on samples distilled after 2.5 milligrams of aluminum had accumulated in the flask.

A similar experiment was made to determine the effect of dissolved silica on the distillation. Minneapolis water with 1.5 ppm added fluoride was distilled alternately with Minneapolis water containing 1.5 ppm added fluoride and 20 ppm added silica. The dissolved silica content of the original Minneapolis water was found to be 6 ppm by the molybdate colorimetric determination. Results of this experiment appear in table 4. No significant differences were found in fluoride recovery.

Table 4. Effect of silica on recovery of fluorides from Minneapolis water

Portion No.	Fluoride added (ppm)	Silica added (ppm)	Fluoride in distillate (ppm)
1 ¹ -----	1.5	0	1.56
2-----	1.5	0	1.56
3 ¹ -----	1.5	20	1.54
4-----	1.5	20	1.56
5 ¹ -----	1.5	0	1.56
6 ¹ -----	1.5	20	1.56
7-----	1.5	20	1.56
8 ¹ -----	1.5	0	1.56

¹ 50 ml. of distillate discarded before collecting sample.

Conclusion and Summary

The distillation method outlined, which requires less than 30 minutes, appears to be sufficiently accurate for routine work. Equilibrium studies have shown that at a distillation rate of 7 ml. per minute and a temperature of 138° to 140° C., distillation of 50 ml. to waste at the beginning of each new sample is sufficient. The addition of aluminum and of dissolved silica to the test samples does not appear to affect significantly the recovery of fluoride from the distillate.

OCCUPATIONAL HEALTH

Training of Health Workers In Los Angeles Program

In the June 1953 issue of *Occupational Health*, Jack C. Rogers notes that public health personnel have generally refrained from entering the field of industrial hygiene.

The occupational health services in Los Angeles have been confined to the division of occupational health (which Mr. Rogers directs) in the city health department. To compensate for the manpower shortage within the division and still provide adequate health services throughout the city's sprawling area, other departmental personnel are being brought into the industrial health program. This is being achieved with the cooperation of the other administrative units of the city health department.

As a result of the program, sanitarians and public health nurses are getting training and technical guidance in their jobs from the division of occupational health. Similarly, sanitarians are training industrial hygienists in industrial sanitation. Public health nurses are being trained to act as contacts between industry and the division of occupational health. Both are being alerted to spot and report to the health department the occupational hazards they uncover.

Mr. Rogers points out that by the actual designation of the occupational health division as the one unit of the department which is responsible for all contact with industry, the danger of overlapping or conflict in plant inspections or in instructions is eliminated. The division thereby handles all matters involving industry from those problems normally assigned to the occupational health program to those connected with water supplies, cross connections, industrial wastes, and others.

Michigan Training Program In Industrial Hygiene

The need for the control and prevention of occupational disease was recognized as early as 1875 in Michigan, according to John C. Soet, chief of Michigan's division of industrial health. The entire field of official industrial hygiene is faced with the twofold problem of keeping the small total of ex-

perienced personnel at its present level and of having some satisfactory source of replacement.

Finding that its entrance requirement of a year's experience in industrial health was losing potential candidates for careers in industrial health, the Michigan Department of Health now offers a training program for graduate engineers and other qualified applicants. This program is designed particularly to attract graduates in chemical engineering to the profession of public health engineering.

The training program combines field work with classroom and lecture sessions over a 23-week period. It now includes a special ventilation conference at Michigan State College, special industrial health conferences at the Michigan School of Public Health and will include the radiological health course offered by the Public Health Service. Trainees do not assume any real responsibility for the first 2 years but work under the supervision of experienced men.

"Our statistics show that over the years the vast majority do remain in industrial hygiene," Mr. Soet stated, adding that, on the average, the trainees remained for a long period of time—long enough to repay the cost of training.

Suspension Notice

Publication of *Occupational Health*, a monthly since 1940, has been suspended with its July 1953 issue as the result of reduction in appropriations. However, *Public Health Reports*—which in recent issues has presented papers on air pollution, human relations in industry, occupational and environmental aspects of various diseases, and industrial dentistry—will give increased attention to technical topics in occupational health. Official agencies, professional organizations, and teaching institutions not now receiving *Public Health Reports* should inquire of the Public Health Service as to their eligibility for official or free subscriptions. Other groups—and individuals wishing personal copies—should purchase subscriptions. *Use the subscription blank on the inside back cover of this issue.*

Recent issues of *Occupational Health* are available at 10¢ a copy from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Legal Notes

on public health

Constitutionality of Delegation of Legislative Powers To State Boards of Health

The provisions of the Arizona State Sanitary Code which were applicable to agricultural labor camps were declared void, and the provisions of an Arizona statute on which the code is based were held to be an unconstitutional delegation of legislative power by the Supreme Court of Arizona on January 15, 1953—*State of Arizona v. Marana Plantations*, 252 P. (2) 87 (1953).

The Arizona statute authorized the Arizona State Board of Health to "formulate general policies affecting the public health," to "regulate sanitation and sanitary practices in the interests of public health," and to "protect and promote public health and prevent disability and mortality."

The court's decision was based on the ground that the statute permits the Arizona State Board of Health to issue "such sanitary laws as its unrestrained discretion may dictate" without statutory guides or criteria.

Pursuant to the statute the Arizona State Board of Health had adopted regulations governing health aspects, water supply, toilets, bathing facilities, housing, fire protection, and garbage disposal at agricultural labor camps. The board of health had charged the defendant, Marana Plantations, with violating these regulations, and the defendant had challenged the basic authority of the board to issue them.

The scope of the police power of States as

it relates to health has been succinctly stated by the Supreme Court of Appeals of West Virginia in *Hayes v. The Town of Cedar Grove*—126 W. Va. 828, 30 SE 2d 726, 731, 156 ALR 702 (1944):

"So far as we know, the power of the State, under its police power, to provide for the health of its people, has never been questioned, but on the contrary, has been stressed as one of the powers which may be given the broadest application; and it is common knowledge that this power has been increasingly exercised, in keeping with advances made in the sciences of medicine and sanitation, in recent years. In these circumstances, courts are reluctant to place limits on what may be done in the interest of the health of a community, so long as unreasonable methods are not employed, nor the natural and constitutional rights of citizens invaded.

"The police power of the State is vested in the legislative branch of our Government, and may be employed or delegated by it, subject only to the control of the courts, to the extent that they may properly act."

Delegations of authority in broad terms to State boards of health to make regulations having the force of law for the protection of public health and for the prevention of disease have generally been upheld by the courts. (See 25 Am. Jur. 287, note 2; 79 L. Ed. 523.) The stricter rule applied in some States, such as Arizona, requires more specific statutory criteria and should be carefully considered when preparing health legislation intended for enactment by the legislatures.

This note has been prepared by the Public Health Division, Office of the General Counsel, Department of Health, Education, and Welfare.

Educational Materials on Water Pollution Control.

Public Health Service Publication No. 256. 1953. 2-fold leaflet. Division of Water Pollution Control, Public Health Service, Washington 25, D. C.

Exhibits, posters, films, and publications may be obtained through Federal and State water pollution control agencies for use by local organizations and groups to aid in the fight to make America's waters safe and clean. Every community needs to feel its responsibility in making and keeping its own water resources clean for drinking and domestic use, for raising crops and livestock, and for recreation uses.

This leaflet contains illustrations and descriptions of the educational materials available to use in the community's fight for clean water. It tells where to send for the items best suited to a specific program for water pollution control.

Basic Drugs—U. S. Public Health Service Hospitals and Clinics.

Public Health Service Publication No. 246. 1953. 165 pages. 50 cents.

The Division of Hospitals, Bureau of Medical Services, Public Health Service, has prepared a handbook of basic drugs for the division's 18 hospitals and 22 outpatient clinics. The handbook is intended as the beginning rather than the arbitrary end in drug therapy. The primary criterion is therapeutic efficacy—selection of the best, the simplest, the fewest, and the safest medicines currently needed in the prevention, diagnosis, and treatment of illnesses. Preference is given to U. S. Pharmacopoeia, the National Formulary, New and Nonofficial Remedies, and Accepted Dental Remedies items.

Unnecessary duplication is avoided in the handbook. Drugs with secret composition are not considered, and

mixtures are included only when they provide substantial advantage over the individual components.

However, "nonbasic" drugs which prove to have a high rate of acceptance by the individual division stations will eventually be added to the list of "basic" drugs in future revisions. The handbook further recommends the rapid and extensive adoption of meaningful, standard drug terminology and the metric system.

The philosophy, objectives, and application of this manual in a general program of maintaining sound drug therapy were presented in an article, "An Objective Approach to Drug Therapy," published in the January 1953 issue of *Public Health Reports*.

Clean Water in the Arkansas, White, Red, and Lower Mississippi Valleys.

Public Health Service Publication No. 252. 1952. 6 pages; illustrations. 5 cents.

It pays to prevent water pollution. Damage to water resources from the wastes discharged by our growing cities and industries can be controlled. The publication cites experiences of several cities of the southwest-lower Mississippi area which were compelled to find new water supply sources because the rivers flowing through or near the cities became polluted. Questions asked are: What happens if the new sources get polluted? Do we go to still more distant ones? Suppose all our public waters except those too small or remote for use get polluted, what then?

Reference is made to a State-Federal report on water pollution in the Arkansas area which lists more than 500 cities as needing some kind of facility for waste treatment. The total cost of those facilities is estimated at \$50 million, but divided among the cities and financed over a period of years, the cost to each

family in the community will be no more than a few cents a day. This, the booklet states, is little enough to pay in return for abating an evil that endangers health, spoils water for industrial and agricultural use, kills fish and wildlife, ruins recreational areas, and is undermining the very foundation of our highly urbanized and industrialized American way of life.

Let's Have Clean Water.

Kit of materials to aid community leaders in their efforts to solve local water pollution problems. Public Health Service Publication No. 264. 1952. 5 parts. \$1.25 per kit.

Theodore Roosevelt said, "The Nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased; and not impaired in value." Water pollution in this country is a constant threat which must be controlled if we are to maintain an adequate supply of safe, clean water for home, for agriculture, for industry, and for recreation.

In order to increase the general awareness of the need for pollution control and to aid communities in developing their own control programs, the Division of Water Pollution Control has prepared this kit of materials designed for local leaders of civic clubs, women's clubs, sportsmen's groups, and the like. Included in the kit are a series of six background readings entitled "The Living Waters," covering the uses of water and the importance of pollution control. A "Chairman's Guide" gives suggestions on discussion techniques and on the use of motion pictures, panel discussions and speakers in local meetings, and provides sources of information for community leaders, including the names of all State water pollution control agencies.

Three publications issued earlier have been incorporated into the kit: "The Fight To Save America's Waters," a story of public health and conservation featuring the familiar comic strip character, Mark Trail. "Clean Water Is Everybody's Busi-

ness" presents a graphic review of the water pollution problem and how it affects various aspects of our daily lives. The third publication, "Water Pollution in the United States," gives a more detailed description of the water pollution problem, and a discussion of the costs and responsibilities for control programs.

A Bibliography of Toxoplasmosis and *Toxoplasma*

Gondii. By D. E. Eyles and J. K. Frenkel. Public Health Service Publication No. 247. 1952. 47 pages. 20 cents.

Toxoplasmosis has been recognized as a human disease for little over a decade; it is therefore possible for the interested researcher to become acquainted with most of the published material on the subject. The authors of A Bibliography of Toxoplasmosis and *Toxoplasma gondii*, who have had occasion to study the literature and have collected reprints, photoprints, or translations of most of the papers, have covered the literature through 1951. A few 1952 papers are included. The earliest paper cited is by Laveran—the date, 1900. This was followed in 1913 and 1915 by other papers by the same author, but 20 years elapsed before more than an occasional paper appeared in the literature. The bibliography contains 920 titles.

In their preface, the authors state that because of time limitations, it was not possible to be critical in selecting titles. Some papers dealing with organisms erroneously assigned to *Toxoplasma* by their authors are included, and there are references to a few case reports in which the evidence that *Toxoplasma* was involved is scant or poor. A number of papers which do not refer to *Toxoplasma* are included as they are now considered to deal with this organism.

In preparing the bibliography, full citations are given if the information is available, and references to abstracts have been listed with the citation of the original whenever possible.

Milk Ordinance and Code. 1953 Recommendations of the Public Health Service.

Public Health Service Publication No. 220. 1953. 242 pages. 75 cents.

The twelfth revision since 1924, the 1953 edition of the Milk Ordinance and Code recommended by the Public Health Service takes cognizance of the notable progress in milk sanitation since 1939.

Like the preceding editions, this revision has been developed with the assistance of the U. S. Department of Agriculture, the Food and Drug Administration, State health and agriculture departments, local health departments, the dairy industry, educational institutions, and individual milk sanitarians.

The book is presented in a form which can be adopted as an ordinance or other legal instrument. Part I contains an abridged form of the recommended milk ordinance suggested for local adoption in States where adoption of ordinances by reference to published standards is considered legal. The Council of State Governments has prepared a model law, "Milk and Food Codes Adoption Act," published in "Suggested State Legislation Programs for 1950."

Part II is the complete ordinance. It details the definition of milk and milk products, the issuing of permits, standards for labeling, inspection, examination, grading, and grades of milk. Section 11 regulates milk and milk products from points beyond the limits of routine inspection.

Part III contains the interpretative code, which together with part IV is to be used as the legal interpretation of the ordinance. It repeats the provisions of part II and gives the reasons for each requirement.

Part IV consists of nine appendices containing detailed explanatory material and standards formerly used in the code, but now transferred to provide a condensed reference to essential detail not

routinely used. The appendixes are an integral part of the code.

On several major and minor questions, the ordinance offers two or more choices. A "degrading" and a "nondegrading" form for enforcement are given. Among other items of choice are: use of reduction tests instead of plate or direct microscopic counts where suitable laboratory facilities cannot be provided; use of a compliance standard of 3 out of 4 samples rather than logarithmic or arithmetic averages of 4 samples.

The Public Health Service is co-operating in a voluntary program of certification of interstate milk shippers. The model ordinance discourages the use of public health regulations to establish unwarranted barriers against acceptance of high-grade milk from other milksheds.

The program of interstate milk certifications was supported by the Committee on Agriculture and Forestry of the United States Senate which "strongly recommended that the Milk Ordinance and Code of the Public Health Service should be used as the minimum standard for the sanitary rating and acceptance of interstate milk shipments."

Home Accident Prevention—A Guide for Health Workers.

Public Health Service Publication No. 261. 1953. 75 pages. Information concerning the availability of this publication can be obtained from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Accidents in the home in 1951 accounted for an estimated total of 28,000 deaths, 110,000 individuals permanently disabled, and 4,200,000 persons temporarily disabled. Because this loss of manpower and the drain upon medical facilities can be prevented, the public health profession is being called upon to take the leadership in developing home accident prevention programs.

In response to numerous requests from educators for assistance in introducing home accident prevention

materials in the training of professional public health workers, this booklet has been prepared as a guide for discussion of the problem.

In 13 sections, this publication outlines the chief problems of home accident control, the major causes of home accidents, and recommended preventive measures. The major causes of accidents covered are: falls, fire, hot surfaces and hot liquids, poisons, gases, toxic vapors, and insecticides, electricity, cutting and piercing instruments, firearms, and lifting, carrying, and lowering. In addition, there are outlines for discussion of the general problem, the epidemiological aspects of accidents, environmental hazards, and human and age factors. Selected references and lists of visual aids are contained in the appendixes.

Cancer Illness Among Residents of Philadelphia, Pa.

Cancer Morbidity Series No. 10, Public Health Service Publication No. 244. 1952. 43 pages; tables, charts. Individual copies available on request to National Cancer Institute, Public Health Service, Bethesda 14, Md.

This publication, the tenth and last of the Cancer Morbidity Series, reports that, as in most of the other cities studied, cancer is apparently increasing among the residents of Philadelphia, Pa.

According to a survey made in 1948, the incidence rate for cancer was 26 percent greater than in 1938, while the prevalence rate was up 21 percent. The greatest increase noted was for cancer of the bronchus and

lung, for which the incidence rose 101 percent in the 10-year period.

Approximately half of the cancer cases diagnosed in 1948 were discovered while localized at the site of origin; 2 out of 10 were not diagnosed until remote tissues had become involved. The fact that less than two-fifths of breast cancer cases—an accessible site—were diagnosed while localized points to the need for improvement in case-finding techniques for accessible as well as inaccessible sites, the report indicates.

The first nine studies in the Cancer Morbidity Series covered the Atlanta, New Orleans, San Francisco, Denver, Pittsburgh, Chicago, Dallas, Birmingham, and Detroit areas. A summary containing geographic comparisons, interpretations of apparent national trends, and special analyses will be issued at a later date.

Small Plant Health and Medical Programs.

By Margaret C. Klem and Margaret F. McKiever. Public Health Service Publication No. 215. 1952. 213 pages; tables. 50 cents.

This publication has been prepared to meet requests for current information on small plant health and medical programs and is designed for employers who wish to establish in-plant health programs and for labor, professional, and other groups that have a special interest in employee health.

The report is concerned primarily with the organization and methods of providing health services in in-

dustry by physicians and nurses. It does not cover the technical phases of industrial hygiene engineering and chemistry or the clinical aspects of occupational medicine.

There are three major sections, the first of which, "Employee Health in Relation to Industrial Expansion," describes the need for employee health programs and the trends in the development of major types of health programs. It gives current data on personnel and facilities serving the employees in establishments of various sizes in the United States as a whole, and in selected States and cities.

Section II, "Type and Extent of Small Plant Health and Medical Programs," is concerned with the development of small plant health programs and the costs and accomplishments of such programs. A description of six cooperative programs, four communitywide projects developed under a variety of sponsorships, and four individual small plant programs is contained in the third section. Appendixes contain detailed information that may be of assistance to those responsible for the development and direction of small plant programs. References to general information in the field are also given.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Nutrition Research

Potentialities in Chronic Disease

By WILLIAM H. SEBRELL, Jr., M.D.

HEALTH MAINTENANCE and constructive medicine—two emerging concepts in modern public health—weigh heavily in any consideration of nutrition in light of our aging population and the increasing significance of chronic disease.

We have made great strides against deficiency diseases, such as pellagra, beriberi, rickets, and goiter. While performing our day-to-day task of maintaining and extending these advances, we can now think in terms of constructive or optimum nutrition, with its implications for promoting healthful, productive longevity.

Aging, nutrition, and public health are directly related in various ways. Special feeding problems and nutritional needs of old people are of primary concern, and nutrition problems are common in the treatment of chronic diseases, for example, when digestion is impaired. Closely related is therapy by dietary means, as in diabetes and gout. An-

other—and fundamental—aspect is chronic disease research, a major objective of which is a better understanding of metabolism.

In much of this effort, primary attention is given to the complex interrelation of nutrients with enzymes, hormones, and other metabolic agents. Encouraging progress has been made, but our knowledge is still fragmentary and requires much supplementation. In other research not directly concerned with nutrition, knowledge and techniques are being developed that can be readily applied in the nutrition field.

Obesity and Chronic Disease

An important but little understood link between nutrition and chronic disease is obesity—a major problem called sharply to attention by actuarial experience, and now being investigated in several laboratories. About a quarter of the adult population is sufficiently overweight to impair health.

No better understood than the role of obesity in disease is the relation between obesity and the aging process. As we pass through the middle years, the percentage of body fat usually rises, though the overall weight may remain the same. Thus, among groups of standard weight, fat may comprise only 10 percent of the body weight in younger men, as compared with 21 percent in older ones. The prevalence of obesity increases to about age 40 for men and 50 for women, and declines after age 60. This decline is due not only to loss of fat, but also to the loss of fat people.

Dr. Sebrell is director of the National Institutes of Health, Public Health Service. On June 22, 1953, he spoke before the Institute of Food Technologists at its 13th annual meeting in Boston on "The changing age pattern of the American population, with its implications in the field of public health." This is a portion of his paper—that dealing with metabolic investigations related to chronic diseases. The full text, with citations, is scheduled for publication in Food Technology for September under the title of "Aging, Nutrition, and Public Health."

*The wee son turned the shining future up;
His father plowed the green past under.*

—From *Man and Boy*, by Alma Robison Higbee



Dr. Goldberger and Dr. Sebrell

The Joseph Goldberger Award in Clinical Nutrition is presented by the Board of Trustees of the American Medical Association for outstanding and sustained work in the field of clinical nutrition. The 1952 award, which includes a gold medal and a check for \$1,000, made possible by a grant from the Nutrition Foundation, was given in December to Dr. William H. Sebrell, Jr., Assistant Surgeon General of the Public Health Service and Director of its National Institutes of Health. He was selected because of his outstanding work in the field of riboflavin deficiency, in pellagra prevention with Dr. Goldberger, and for his continued work in the field of clinical nutrition. The previous recipients of the award were Dr. Randolph West and Dr. Fuller Albright. In response to the presentation of the award, Dr. Sebrell discussed the present status and the future of nutrition as it relates to medicine in America. His remarks were published in the *Journal of the American Medical Association*, May 2, 1953, pp. 42-44.

On pages 737-746 are two recent papers by Dr. Sebrell—one dealing with nutrition research, the other with public health aspects.

JOSEPH GOLDBERGER'S life (1874 to 1929) "was a Horatio Alger experience common to other great Americans. He was born on a peasant tenant farm in Czechoslovakia in 1874 and brought to New York City when he was 7," according to Williams (p. 279, *The United States Public Health Service, 1798-1950*). "For the early part of his life he delivered groceries for his father on the lower East Side. At 16, he decided on a course of civil engineering, but 2 years later switched to medicine after he heard the Harvey Lecture given by a Bellevue Hospital College physician. In 1895 he graduated second in his class at Bellevue, where he had acquired a reputation as a hater of routine but a master of case history writing. To him every case was a great and absorbing mystery, the solution an exciting challenge. After a 2-year try he decided that private practice was not his field and he entered the Marine Hospital Service. He performed brilliant and dangerous work on typhus fever, operating always at the epidemic scene. He also made important studies of the Mexican form of typhus fever and of yellow fever. But the chance to exercise his talents, his greatest contribution to humanity, came when he was put in charge of pellagra investigations."

Continued from page 737

The fact that obesity is correlated with aging and chronic disease does not in itself imply a causal relation. Unknown etiological factors may be common to these conditions. In various studies, however, caloric restriction has prevented cancer in mice, prolonged greatly the life of rats, and reduced the signs of diabetes in humans. Moreover, striking decreases in the incidence and severity of diabetes and hypertension accompanied undernutrition and loss of weight in certain European countries during both World Wars. It may reasonably be assumed then that practical advances against obesity would have far-reaching effects upon public health.

This problem is fertile for research. We should like to know, for example, what benefits in longevity accrue to the middle-aged person who reduces and maintains the reduction. We need clarification of the mechanism, psychological or metabolic, that leads to overeating.

Wading through the wilderness of conflicting theories as to the cause of pellagra, and in the face of those who claimed to have proved that it was infectious in origin, Goldberger's first theory, which he announced in 1914, was that pellagra was due to a deficiency in diet. This he proceeded to prove conclusively and devised ways in which the disease could be prevented and cured. Even so, he did not discard the possibility that pellagra might have an infectious element until he proved to his own satisfaction that this could not be true. This he did by injecting blood from patients with pellagra into himself, his associates, and even into his own wife. Furthermore, he made pills from the intestinal discharges and the skin rash scales from pellagrous subjects and ate them as further proof that no infectious agent was involved.

Later he sharpened his ideas about the dietary origin of pellagra to include the concept that a "vitamine" deficiency was involved. This was a quite new concept in disease etiology since Funk had coined the name "vitamine" only in 1911. Later his ideas shifted to include the possibility that an amino acid deficiency, specifically cystine and tryptophan, was causative. Both of these theories were proved after Goldberger's untimely

death, although it was not until 1945 that the amino acid tryptophan was clearly implicated.

Never one to form a theory and fail to test it, Goldberger and his associates reported in 1922 on tests with cystine and tryptophan, although their claims for therapeutic value were very conservative. For reasons unknown, he never reported on some dramatic results which he and his associate Tanner obtained with tryptophan alone. Nicotinic acid was not known as a vitamin during his lifetime so it could not be tested.

Goldberger's influence on nutrition research continued long after his death and continues even today. The dog, which he introduced and established as a tool in pellagra research, is still used today. The dietary data which he and his associates collected have been used recently to recalculate the human requirement for nicotinic acid.

Not the least of his amazing abilities was his capacity to gather brilliant associates who ably continued the work after his death. His career in research was marked by courage, rare intellectual insight, wisdom, and perseverance. In the words of Dr. Arthur M. Stimson: "He illuminated everything he touched and won the admiration and affection of his associates."

—JAMES M. HUNDLEY, M.D.

We should define the role of heredity—a primary factor in the obesity of certain strains of mice. And we may hope that such knowledge will improve means for controlling obesity through public health programs.

Fat Metabolism and Atherosclerosis

This subject of obesity provides a point of transition to the role of fat metabolism in the development of cardiovascular diseases. Among these is atherosclerosis, the most serious form of hardening of the arteries, which causes 9 out of 10 heart attacks and seriously disables hundreds of thousands of persons. This is a type of arteriosclerosis in which the lining of the artery thickens and pushes inward. Deposited cholesterol, a fatlike substance, is a part of this growth.

Observations on patients following weight reduction have shown a decline in circulating cholesterol of the type suspected in atherosclerosis. To what extent the lower cholesterol level

is due to reduced fat ingestion rather than reduction of weight has not been determined.

Research on atherosclerosis is proceeding along many lines. Most investigators, however, work from the hypothesis that the body's fat-handling system plays a part in the development of the disease. Not only have abnormal cholesterol-bearing molecules been found in the blood of sclerotic patients, but some animals on high cholesterol diets develop sclerotic lesions.

Investigators at the National Institutes of Health recently identified a "clearing factor," which diminishes the cloudiness of blood occurring after a fatty meal. In normal persons this condition clears automatically within a few hours, but in others it persists, possibly leading to atherosclerosis. The clearing factor not only eliminates the cloudiness, but appears to break down the abnormal cholesterol-bearing molecules that are particularly suspect.

The fact, however, that the body readily

synthesizes cholesterol from simple, ever-present substances compels caution. Moreover, we do not yet know whether the dietary level of the substance is of practical significance. Cholesterol metabolism involves such nutrients as choline, other B vitamins, and some amino acids; and various nutritional deficiencies affect the deposition. For persons with atherosclerosis, the best diet known at present is a balanced one, such as normal people require. If other problems, such as hypertension, are involved, a special diet may be indicated.

Cancer and Nutrition

Cancer is another chronic disease in which the science of nutrition is contributing valuable information. Dietary manipulations have been shown to exert pronounced effects on cancer causation in animals. Caloric restriction prevents or delays the appearance of various tumors; and restriction of certain amino acids gives similar results. Choline deficiency, on the other hand, induces liver cancer in the rat. These observations have no immediate practical value, since the preventive diets abolish breeding capacity and choline occurs in a wide variety of foods. Such findings, however, are important leads for further research.

In human beings, cancers already established have shown little response to dietary alternations; but in animal experiments, alternate restriction and supply of a vitamin, such as riboflavin or pantothenic acid, has appreciably prolonged life. Vitamin antagonists have produced similar effects: in some children, chemical antagonists to folic acid, such as aminopterin, have been of temporary benefit in leukemia. Recent advances in leukemia concern certain pyrimidine compounds. When administered to animals, these drugs in combination with a folic acid antagonist appear to inhibit neoplastic growth more than antifolics alone. For nutritionists, the exploration of such antimetabolites offers rich opportunities for extending knowledge of normal and abnormal growth.

Bone and Joint Diseases

The study of arthritis, the principal crippling disease, has been hampered by lack of a method for producing the disease in experimental animals. Recently, however, several investi-

gators have produced arthritic changes by dietary means.

At Washington University in St. Louis, a condition resembling osteoarthritis was induced in mice of a highly inbred strain. A high fat diet was fed to one group, a high protein diet to another. The mice that received the fat-enriched diet showed an acceleration of skeletal aging and an increased incidence of osteoarthritis, whereas protein enrichment retarded aging of the joints and delayed the onset of joint disease.

Other groups of workers, one at Kansas City College and another at Cambridge University, report a disease in vitamin-C-deficient guinea pigs that resembles rheumatoid arthritis. It is interesting that these joint changes can be prevented with cortisone.

A recent advance now being applied clinically concerns osteoporosis, a brittle condition of the bones due to decalcification. It is primarily a disease of the aged, but may occur at any age as a late phase of arthritis. At the Russell Sage Institute of Pathology, osteoporosis is being treated successfully with the metal strontium. After maximum calcium storage, strontium can still be stored in the bones. Maximum retention of both minerals is achieved with the aid of auxiliary agents—vitamin D and sex hormones. This, as well as the fact that osteoporosis often results from ovarian insufficiency, clearly suggests a relation between nutrition and hormones for which we have no explanation.

Nutrition science, using new biochemical approaches, offers much promise against diseases of the bones and joints. Even the study of an inorganic nutrient such as calcium presents attractive possibilities. The skeleton is now regarded as a living tissue, particularly in view of tracer studies showing that calcium enters and leaves the skeleton with considerable rapidity. Little is known, however, about the regulation of calcium metabolism. How, for example, is calcium mobilized to the area of a tuberculous lesion? In leprosy, though a bacterial disease, why do entire bones sometimes disappear as a result of resorption? Explanations of such metabolic disturbances could aid in the prevention of arthritic deformity.

Research for Optimum Nutrition

Nutrition science has made great strides in the past, but the opportunities for further progress are limitless. Long-term investments in fundamental research represent an approach historically proved to offer the best returns in the long run. There is a constant exchange, of course, between basic and applied science. Research in nutrition, applied as well as fundamental, will help workers throughout the world in promoting health and long life.

A constructive approach requires that we strive to attain, and to maintain, optimum health while repairing damage. Fortunately, the population as a whole has lost much of its complacency concerning nutrition. Food technology, through food fortification, increased availability and palatability of foods, and other innovations, is a major aspect of the public health approach through which the need for

specific nutritional therapy may some day be eliminated. The human body is remarkably adaptable, and inherent abnormalities of digestion and metabolism may lead to compensatory dietary practices. Unfortunately, however, the contrary is frequently the case; selection and consumption of food often obey a misleading appetite, and the result may be damage and disease.

Nutrition science is only beginning its venture into gerontology and the major chronic diseases. Whether substantial contributions are achieved in the near future depends largely on the cooperative efforts of many individuals and groups. No longer is scientific progress by lone investigators the rule, as in the days of Pasteur and Ehrlich. Many disciplines must coordinate their attack. Nutrition research and theory must be converted to food therapy, nutrition knowledge, to public health gains.

Enrichment

a Public Health Approach to Better Nutrition

By WILLIAM H. SEBRELL, Jr., M.D.

WE ARE inclined in these modern times to take our knowledge of nutrition for granted and to underestimate the importance of its application. Consider for a moment the problem of malnutrition in earlier days. Vasco de Gama, in his search for a water route to the East, rounded the Cape of Good Hope and returned with only a third of his crew, the rest having died of scurvy. At one time the channel fleet of the British Navy could not be manned because of the prevalence of scurvy among the crews. In the late 19th century, 40 percent of the seamen in the Japanese Navy died of beriberi; and in Italy at about the same time, the reported cases of pellagra exceeded 104,000. One by one, these and other serious diseases re-

sulting from specific dietary deficiencies have yielded to science.

The progress of nutrition research, however,

Dr. Sebrell presented this paper at Toronto on January 26, 1953, as Canada inaugurated a program of flour and bread enrichment. Speaking before the First Nutrition and Enrichment Conference of the Baking and Milling Industries, he characterized the Canadian enrichment program as "one more forceful blow in the prevention of malnutrition . . . further indication of the increasing role of enrichment in the health and strength of nations." His discussion, here somewhat condensed, appears in full in The Canadian Hospital for June 1953.

is only part of the story of effort in the nutrition field. The complete picture includes what might be termed the public health movement—the application of nutrition knowledge through industry, agriculture, education, government, and, of course, the medical profession. In this movement, an important trend in Europe and North America has been a broadening of the attack to extend preventive measures to successively larger groups of people.

Early Applications

Available knowledge prior to World War I was used mainly for the prevention or alleviation of dietary deficiency diseases in the individual. Citrus fruits and juices were fed to seamen, and later to children, to treat and prevent scurvy; cod liver oil was used in treating rickets; extracts of rice polishing, in beriberi. The next step, an organized public health approach, was the planned distribution of preventive dietary supplements, such as cod liver oil, butter, and iodized salt. Meanwhile, the isolation of vitamins progressed; and just prior to World War II, it became practical to improve staple foods with synthetic nutrients as a means of preventing dietary diseases in large populations.

In the United States, on a growing scale, vitamin D was added to milk and vitamin A to margarine. Thus, the principle being used in the control of goiter with iodized salt—the fortification of food—was extended to rickets and vitamin A deficiency. Early in 1941 the same broad approach was applied to the prevention of beriberi, pellagra, ariboflavinosis, and iron-deficiency anemia, when enriched bread and flour were introduced.

Public preference for highly refined foods had left the American diet deficient in many important respects. For example, the patent milling process, by removing most of the germ and bran shorts from flour, reduces the thiamine content about 90 percent and the niacin, riboflavin, and iron 70 to 85 percent. White bread and refined sugar and fats are widely preferred for taste, appearance, and durability. Together they furnish a large proportion of our calories. This resulted in less than satisfactory amounts of essential nutrients per capita and

led inevitably to dietary diseases, especially in poorly fed sections of the population.

The enrichment of bread and flour had therefore received the enthusiastic endorsement of the Nation's foremost nutrition scientists, including the American Medical Association's Council on Foods and Nutrition and the National Research Council's Food and Nutrition Board. With the advice of these groups, the Food and Drug Administration established standards for enriched wheat products, permitting specified amounts of the four nutrients, thiamine, niacin, riboflavin, and iron. Certain other substances, such as calcium, vitamin D, and wheat germ, can also be added, but this has not been done on a wide scale. Calcium and other nutrients are often supplied in bread through use of dry milk solids, a practice that should be extended.

Status at Pearl Harbor

By the time the country entered World War II, the enrichment of flour and bread had become well established. Within another year about three-quarters of the bakers' white bread and almost all family flour was enriched on a voluntary basis. A further step in the application of nutrition knowledge was now feasible—nationwide control of specific dietary diseases; and a program to that end was soon launched. During periods of war, foods that are costly to produce tend to become scarce, and greater dependence is placed upon cereal products, the least expensive foods in terms of man-hours and acreage. Consequently, it was apparent that cereals as an important part of the national diet must contain essential nutrients.

Serious consideration was given to the possible use of long-extraction flour, which retains some of the vitamins and mineral-rich portions of the wheat. Some reasons against requiring the product, besides the general preference for white flour, were its perishability, its limitations for pastry, and the dependence of the animal food industry upon the residues of patent milling. Moreover, it was believed that the prohibition of white bread and flour would be difficult or impossible to enforce in the United States. There was also the success achieved with voluntary enrichment, as well as the fact

that enriched products were better supplied with the nutrients in question—an important health consideration.

In January 1943 the Federal Government issued war food order No. 1, requiring the enrichment of all bakers' white bread with thiamine, niacin, riboflavin, and iron. Subsequently, the nationwide nutrition movement brought about improved agricultural practices, better nutrition education, a national school lunch program, and advances in food handling, preservation, and distribution. Since October 1946 when the war food order ceased to be effective, enrichment of bread and flour has not been required by Federal regulation, but more than half the States have passed laws making enrichment mandatory. In the remaining States, voluntary enrichment is being continued extensively, according to recent surveys by the industry.

Assessment After a Decade

After nationwide practice of more than 10 years, what have been the health gains due to better nutrition, and to what extent are they attributable to the enrichment program? What, if any, have been the harmful effects? What is the future of food enrichment as a means of attacking malnutrition throughout the world?

Unequivocally, we can say that there is no evidence of harm from the program, nor reason to expect it. If the diet contains slightly more than the required amount of a nutrient, the excess is simply excreted. These statements apply also to the products commonly fortified with iodine and vitamins A and D. There is a wide margin of safety between recommended and harmful levels.

As to health gains, on the other hand, there is ample evidence of the efficacy of the nutrition program and every reason to ascribe much of the success to bread and flour enrichment. No more dramatic history of health progress could be cited than that of pellagra in the United States. In the 1920's and 1930's, this was our most serious deficiency disease.

Pellagra and Niacin

Pellagra results from a diet low in two nutrients, either of which will prevent it—the

vitamin niacin and the protein component tryptophan. Mild cases are much commoner than extreme cases, and mortality rates reflect only a small proportion of the pellagra problem. In a region of high prevalence, at least 33 cases per death were found in 1917, before control measures were instituted. At one time, an estimated 200,000 were afflicted with pellagra in the United States. In 1928, at the height of reported mortality, there were approximately 7,100 pellagra deaths, or 6 per 100,000 population. Nearly 98 percent of those occurred in southern States where most of the available land was used for nonfood crops, such as cotton and tobacco.

For the past 25 years, the death rate from pellagra has shown a general downward trend. This is attributable not only to the national nutrition program, but also to better medical treatment, shifting of the population, extensive changes in agricultural practices, and gradual economic improvement in the south through the establishment of industry there.

It is interesting to note the pellagra mortality at key points in the nutrition program. By 1937, the year niacin was isolated, pellagra mortality was about half that of 1928, or 2.5 per 100,000. Cures with niacin were reported that year by several clinicians, and thereafter the decline was more rapid. In 1943, 2 years after niacin-enriched foods appeared on the market, the rate was 1; by 1950 it had dropped to 0.2, representing an unprecedented low of 260 reported deaths in the entire country.

In North America, mortality data do not reflect the true health importance of the deficiency diseases, since very few affected persons die. It is the number of cases—the people limited in their capacity to work and enjoy life—with whom we are especially concerned. Nearly all of the estimated 200,000 cases of 20 years ago were in the south. In contrast, among 10,000 recent admissions to the Hillman General Hospital in Birmingham, Ala., not a single pellagra was found—and this, at one of our permanent pellagra research centers in an area where the disease was once rampant.

At the Cincinnati General Hospital, where 34 cases were diagnosed in 1939, only 1 case was seen from 1946 to 1948. If enrichment had done

nothing but help control this one disease, it would have paid for itself many times over in lives saved and people rehabilitated.

Even among chronic alcoholics, once commonly afflicted, pellagra has become rare. In 1948 and 1949, the Army Medical Nutrition Laboratory examined approximately 16,000 alcoholic inmates of the Chicago House of Correction and found only 2 with pellagra, 3 with ariboflavinosis, and 1 with possible beriberi. The decline of those diseases among alcoholics clearly dates from the introduction of enrichment.

B-vitamin Deficiencies

Beriberi is a disease resulting from lack of thiamine, another vitamin of the B group. Like other deficiency diseases, beriberi has no geographic limitations, though more than 90 percent of the cases are reported among rice-eating peoples. How serious it can be as a public health problem is shown by the fact that in the Philippines in 1948 beriberi was second only to tuberculosis as a cause of death. Small outbreaks have occurred in such places as Australia, Iceland, and Labrador. In the United States, Great Britain, and other western countries, beriberi has been frequently reported among chronic alcoholics and the inmates of institutions; but it is not an important cause of death among peoples consuming a variety of foods. In its less severe forms, however, there was evidence that thiamine deficiency was sufficiently prevalent in the United States to warrant addition of the vitamin to flour and bread.

Ariboflavinosis—riboflavin deficiency disease—is reported frequently in various parts of the world. It often occurs in conjunction with other B-vitamin deficiencies, especially pellagra. Ariboflavinosis was not recognized as affecting humans until 1939. As a result, the incidence in the United States was not accurately estimated, but there is no doubt of its former prevalence.

Like pellagra, these B-vitamin deficiency diseases—beriberi and ariboflavinosis—have declined in the United States as a result of improved nutrition to which enrichment has demonstrably contributed.

General Effects of Enrichment

While the demonstrated prevention of specific deficiency diseases is the real test of enrichment, other evidence of its effect on the nutritional status of the population should not be ignored. Over the past 10 or 15 years, there has been a general elevation in the nutritive value of our national diet. This means primarily a higher vitamin, mineral, and protein intake. As shown in studies by the U. S. Department of Agriculture, the most striking increases have been in thiamine, niacin, riboflavin, and iron—with a sharp rise beginning about 1941, when enriched bread and flour were introduced. In 1945 and 1946, the peak years of per capita consumption, these four nutrients exceeded prewar levels by a third to a half.

The average American in 1945, as compared with what he would have received without enrichment, obtained in his food 27 percent more thiamine, 19 percent more niacin, 12 percent more riboflavin, and 17 percent more iron. The benefits were greatest among the lower income group, whose diet is poorest and incidence of deficiency diseases highest.

Thus, we are able to trace various specific health gains due to better nutrition and even to assign a considerable measure of that progress to the enrichment program. Other advances in health are undoubtedly associated with the nutrition movement, but their contribution is harder to prove. Maternal and infant deaths, for example, have declined to unprecedented levels, and nutritional changes have been significant. Similarly, there have been appreciable increases in growth rate and stature. Downward trends in mortality from infections, particularly tuberculosis, have paralleled the elevation of nutritional status. In short, the benefits of improved nutrition have exceeded our most optimistic expectations.

Problems Ahead: Chronic Diseases

By no means, however, does all this imply that our national diet is now perfect, nor that malnutrition in the United States is a thing of the past. I have discussed only the advances, the favorable trends. Many problems still confront us, some of which mount in significance

as various factors lengthen the life span and increase the number of older people in the population.

One such problem is our high mortality from chronic diseases frequent among the aged, such as the cardiovascular diseases, cancer, diabetes, and cirrhosis of the liver. Another problem, the extent of which is uncertain, is that of borderline dietary deficiencies—conditions presenting an indefinite clinical picture, but nevertheless one of suboptimal health.

With regard to the problems attacked through enrichment, we know that anemia, by generally accepted standards, is still widespread in the United States, especially among women. This is thought to be largely nutritional in origin. The commonest form of anemia—secondary, or hypochromic—is attributed to iron deficiency; but the incidence has shown little change, despite the increase in the average consumption of iron. Does this mean that the problem is overestimated because of an unrealistic health standard, that iron is poorly utilized, or that iron deficiency is not responsible for the condition? Only further research can provide an answer.

There are many other important research problems in nutrition. Our approach to these must remain broad. The history of science shows conclusively that the long-range point of view—the emphasis upon fundamental investigation, often with little promise of practical reward—is the most productive approach in the long run. Practical applications of basic knowledge will suggest themselves.

For the most part, the remaining nutrition problems require further research and intensive education. Enrichment should certainly be continued and, along some lines, extended. Not only would a relaxation of that effort permit a relapse of nutritional status, with a high probability of increasing deficiency disease, it would also undermine our nutritional foundation, the bulwark of cheap staple foods—bread, flour, milk, salt, margarine, and so forth—upon which the Nation's health would depend in an economic or other calamity. The National Research Council has described enrichment as "low-cost insurance against certain nutritional ills."

Nutritionists and allied workers in the United

States appreciate the importance of developing their programs in full recognition of world nutritional needs. Today, serious world problems critically involve us all—problems that often reflect the ratio of food supply to population. Established techniques intensively applied can often remedy the local shortage of a vitamin—as shown recently in the Philippines, where rice enrichment and other measures reduced beriberi deaths in an experimental zone by 90 percent or more. The successful expansion of this program in the Philippines would be a major public health advance for that country.

Enrichment, Education, Research

Enrichment is a powerful weapon against malnutrition, but it must not become the sole or final effort. Nutrition research must be intensified; and sound programs of nutrition education—the essential link between professional knowledge and the improvement of food practices—must be vigorously pursued.

These are aspects of the public health program in nutrition to which industry and government can contribute, as they have done notably in the past. Let me stress the necessity of cooperation between industry and government in this movement. It has been our experience that businessmen are deeply interested in the Nation's health, that they recognize its great importance and that they want to be helpful and to do the right thing. They also have their feet on the ground and properly act only when strongly convinced. Such cooperation is highly productive in the field of education. Here, industry can bring to bear effective techniques and attractive media, which government agencies cannot obtain. Whenever government and industry participate in a sound program of nutrition education, as they have done in the United States, material progress in public health can be expected.

Nutrition education, as its main objective, should seek to establish public demand for an adequate diet, taking into account a wide range of consumer incomes. The physician, health officer, nurse, teacher, and other key persons in the community must be prepared to guide individuals and institutions in selecting the right foods; and for this, they must be skilled in the

practicalities of feeding—food values relative to cost. In commercial advertising, a greater effort should be made to show the proper relation of the promoted product to good nutrition as a whole. Finally, community leaders, advertisers, nutritionists, and others in the role of educator should focus primarily upon the housewife, who selects and prepares the meals and guides in the formation of food habits.

Sound food habits must always be the major objective. It is unlikely, however, that enrichment will ever be entirely superseded by informed food selection, since food values vary seasonally and geographically, and selection to some extent is economically determined. The modern attack upon malnutrition should be spearheaded by enrichment, backed by education, and controlled by research.

CIRCULARIZATION

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Agglutination of *Treponema Pallidum* In Syphilitic Serums

By CHARLOTTE P. McLEOD, Sc.D., and HAROLD J. MAGNUSON, M.D.

NUMEROUS unsuccessful attempts have been made to demonstrate specific agglutination of pathogenic *Treponema pallidum* in syphilitic serum. Most such attempts have met with failure due to the tendency of the organisms to agglutinate spontaneously. Interest in the subject was revived by the report of Tani (1) that Antiformin-killed spirochetes showed no such spontaneous clumping, but were agglutinated in syphilitic serum after an incubation period of 24 hours; and that organisms so treated provided satisfactory antigens for the serodiagnosis of syphilis. More recently, specific agglutination of *T. pallidum* was reported by Gain (2) who obtained antigens which showed no spontaneous agglutination from syphilomas of X-irradiated rabbits; and also by Hardy and Hollander (3) who prepared satisfactory heat-killed spirochete suspensions from lesions of syphilitic rabbits treated with cortisone.

The agglutination technique described in the present paper was devised by bringing together the findings of two separate lines of investigation. The experiments of Tani (1) were confirmed and extended. At the same time, there was in progress a study of complement in the

Treponema pallidum immobilization test (TPI). In testing the fresh serum of various animal species for complement activity, it was noted that fresh steer, or other bovine, serums caused disappearance rather than immobilization of the spirochetes, and also caused agglutination of sensitized sheep cells. It was then found that the agglutination of *T. pallidum* in syphilitic serum was greatly enhanced by the addition of fresh steer serum. These effects of fresh steer serum in both the TPI test and the agglutination test were due to the presence of congenitinin (4) in addition to complement.

By means of the agglutination technique with fresh steer serum the presence of syphilitic antibody may be demonstrated in a test which utilizes killed spirochetes and is completed in only 2 hours. It will be shown that this reaction appears to have a specificity comparable with that of the TPI test, and sensitivity many times as great.

Methods

The Nichols strain of *T. pallidum* was employed in all experiments. Serum samples from normal or syphilitic human donors were stored at -20°C . until tested. Fresh steer or fresh guinea pig serum was distributed in suitable amounts in small containers and stored in a CO_2 chest at -76°C ., and samples were not thawed until immediately before use. The steer serum was frozen on the day the blood was collected; the guinea pig serum usually was frozen on the day following collection.

TPI tests were set up by the method of Nelson and Mayer (5) with modifications and controls

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previously described (6, 7). Unmodified Nelson's medium (8) was used in titrating serum from patients with untreated primary, secondary, or latent syphilis. Five times the usual concentration of sodium thioglycollate (9) and 5 percent of inactivated normal rabbit serum were added to the medium in all other experiments. Each assay tube contained a total volume of 0.45 cc., which included 0.3 cc. spirochete suspension, 0.1 cc. of undiluted steer or guinea pig serum as complement, and 0.05 cc. of test serum or dilution. TPI assays were incubated for 16 hours at 37° C.

In tests with sheep erythrocytes, suspensions of cells and dilutions of serum were made in physiological saline (0.85-percent sodium chloride). Sensitized cells were prepared by mixing equal volumes of a 3-percent sheep cell suspension and a 1:500 dilution of rabbit amboceptor. (Amboceptor was obtained from the Venereal Disease Research Laboratory, Chamblee, Ga.) Unsensitized cells were similarly prepared with saline instead of amboceptor. Sheep cell suspensions were used in a volume of 0.4 cc. In testing for residual complement in TPI assays or in complement titrations, the tubes were incubated in a water bath at 37° C. for 30 minutes.

In preparing the antigen used in agglutination tests with fresh steer serum, spirochetes were obtained from testicular lesions of rabbits inoculated 8 to 10 days earlier. The testicles showing 3+ induration were sliced in an egg cutter and extracted with 5 to 10 cc. of 0.85-percent sodium chloride per testis. Three such extractions were carried out for 1 hour at room temperature on a rotating shaker. The saline extracts were pooled and centrifuged for 10 minutes at a low rate of speed to sediment the larger tissue particles. The supernatant was then spun for 1 hour in a Sorval angle centrifuge (approximately 20,000 G) to sediment the spirochetes. The supernatant was discarded, and the organisms were resuspended in saline and killed by heating in a water bath at 56° C. for 40 minutes. The suspensions then were further diluted with saline to contain approximately 60 spirochetes per high power field, and were stored at 4° C. Antigens so prepared showed no spontaneous agglutination

during storage periods which lasted for as long as 3 months. However, there often appeared, during storage, a finely granular precipitate in which some of the spirochetes became enmeshed. This material was present to a greater or less degree in the different suspensions, and usually could be removed or greatly reduced by centrifugation.

Agglutination Studies

In preliminary studies, the findings of Tani (1) with Antiformin-killed spirochetes were repeated, and other methods of killing the organisms were investigated. (Antiformin, which contained not less than 6 percent sodium hypochlorite, was purchased from American Antiformin Co., Brooklyn, N. Y.) unwashed spirochete suspensions were treated with Antiformin in final concentrations of 0.1 to 0.25 percent for a period of 30 minutes at room temperature. The organisms then were sedimented by centrifugation and resuspended in saline containing 0.5 percent phenol. One-tenth cubic centimeter of antigen was added to 0.1 cc. of syphilitic serum dilution, and the mixtures incubated in a water bath for 26 to 27 hours at 37° C. Specific agglutination was obtained by this method, and a positive control serum (human pool B) regularly showed 3+ to 4+ agglutination in the 1:32 dilution.

In further experiments, aliquot portions of the unwashed suspensions were subjected to different treatments. One portion was untreated and the spirochetes allowed to die on standing at 4° C. The organisms in the other portions were killed by treatment with Antiformin, by heating at 56° C. for 40 minutes, or by the addition of a final concentration of 1:4,000 Mapharsen, 0.2-percent phenol, or 0.1-percent formalin. Agglutination similar to that with Antiformin-killed antigens was obtained with the untreated, heated, or Mapharsen-killed organisms. All of the phenol-killed antigens showed some degree of spontaneous agglutination, and formalin-killed organisms failed to agglutinate.

Six different saline testicular extracts were used. Four of these provided satisfactory antigens. They were obtained from lesions of rabbits inoculated 7, 9, 11, or 11 to 13 days

earlier. Two extracts obtained from 9-day lesions or from pooled 7- to 14-day lesions were unsatisfactory, showing 1+ to 4+ spontaneous agglutination in all antigens except the formalin killed. The Antiformin-treated antigens showed the least amount of spontaneous agglutination, and the phenol-killed organisms showed the greatest amount.

Use of Fresh Steer Serum

In testing serum from numerous animal sources for complement activity in the TPI test (data to be published), considerable variation was noted in the serum from different species. While none of the serums showed immobilizing activity in the absence of hemolytic activity as measured by the usual rabbit amboceptor-sheep cell system, these two properties were not necessarily present in the same degree. Of particular interest in these studies was the finding that fresh steer serum caused complete disappearance of the spirochetes under the conditions of the TPI test. Also when a syphilitic serum was tested quantitatively with fresh steer serum, the spirochetes which reappeared at the end point of the titration were motile and there was no evidence that immobilization occurred between the stages of disappearance and reappearance. When tested under identical experimental conditions, the "disappearance titer" with steer serum and the immobilization titer

with guinea pig serum were similar after 16 hours' incubation. However, it was found by reading the tests at 6 hours that disappearance proceeded more rapidly than immobilization. Disappearance occurred also when aliquot portions of the suspensions were heated at 56° C. for 40 minutes, and the tests incubated under either aerobic or anaerobic conditions.

In tests for residual complement there was 4+ agglutination but no hemolysis of sensitized sheep cells in tubes containing fresh steer serum. The tubes containing inactivated steer serum showed neither hemolysis nor agglutination. Table 1 shows the results of titrating steer serum against sheep cells as described under "Methods." Both sensitized and unsensitized cells were lysed in high concentrations of fresh steer serum, and were agglutinated in relatively high dilutions. The activity of the fresh serum was slightly higher against the sensitized than against the unsensitized cells. Inactivated steer serum showed no lytic activity, but a low degree of agglutinating activity against only the sensitized cells.

In further experiments with steer serum in the TPI test, it was noted that disappearance of the organisms sometimes took place in control tubes which contained spirochetes plus fresh steer serum, or spirochetes plus fresh steer serum and normal serum. Also a negative end point was not obtained in the titer of the positive control serum. In duplicate assays run

Table 1. Effect of steer serum on sheep cells
[0.4 cc. of serum or dilution + 0.4 cc. of cell suspension]

Dilutions of steer serum	Fresh steer serum				Inactivated steer serum			
	Sensitized cells		Unsensitized cells		Sensitized cells		Unsensitized cells	
	Lysis	Agglutination	Lysis	Agglutination	Lysis	Agglutination	Lysis	Agglutination
0-----	3+-----	4+-----	3+-----	4+-----	Negative	2+-----	Negative	Negative.
1:2-----	1+-----	4+-----	±-----	4+-----	do-----	Negative	do-----	Do.
1:4-----	Negative	4+-----	Negative	3+-----				
1:8-----	do-----	4+-----	do-----	2+-----				
1:16-----	do-----	4+-----	do-----	1+-----				
1:32-----	do-----	2+-----	do-----	Negative				
1:64-----	do-----	Negative	do-----	do-----				
1:128-----	do-----	do-----	do-----	do-----				

NOTE: The designations 4+, 3+, 2+, or 1+ refer to the degree of hemolysis, or to the degree of agglutination of cells which resisted hemolysis.

Table 2. Results of TPI tests on serums from patients with suspected biological false-positive reagin tests, using fresh serum from both guinea pig and steer as sources of complement

Total serums tested	Results with guinea pig serum				Results with steer serum			
	Positive	Negative	Doubtful ¹	Nonspecific immobilization ²	Positive	Negative	Doubtful ¹	Nonspecific immobilization
20	3	12	1	4	6	13	1	0

¹ The serum from this patient was positive in the agglutination test.

² Three of these patients were positive and one negative in tests with fresh steer serum.

with the same spirochete suspension and guinea pig complement, all controls were satisfactory. From the results with guinea pig complement it seemed clear that the spirochetes were not sensitized in vivo. It seemed more probable that steer serum contained a natural antibody to *T. pallidum* as well as to sheep cells, and that the effect of this antibody was apparent under the conditions of the TPI test only when the spirochete suspension contained relatively little anticomplementary or other interfering substances.

It was later found when washed killed antigens were used that disappearance of the organisms always occurred in fresh steer serum, and agglutination, but no disappearance, in heated steer serum. Immobilizing antibodies could not be demonstrated in heated steer serum when assayed in the TPI test with guinea pig complement even when twice the usual amount of serum was tested. The presence of "reagin" in steer serum was suggested by a positive Kahn test. However, VDRL and Mazzini tests were negative.

Serum samples from 20 patients with suspected biological false-positive reagin tests were examined by the TPI technique, using both fresh guinea pig and fresh steer serum as sources of complement. The two tests on the same patient were always run in the same assay. Table 2 shows the results of this study. There was agreement between the results obtained with the two methods except in four serums which showed nonspecific immobilization when assayed with guinea pig complement. Three of these serums were positive and one was negative when tested with steer serum. One serum which gave a doubtful result by

both methods was later positive in the agglutination test with fresh steer serum.

Use of Syphilitic and Steer Serums

Spirochete suspensions washed in saline and heat killed, as described under "Methods," were used as agglutinating antigens. In studying the effect of adding fresh steer serum to the agglutination mixtures, it was noted that the organisms disappeared in controls of fresh steer serum, and showed 2+ agglutination in controls of heated steer serum. By suitably diluting the steer serum in saline, these effects were overcome, and sufficient activity remained to greatly enhance the agglutination of *T. pallidum* in syphilitic serum.

In setting up agglutination tests, 0.1 cc. antigen, 0.1 cc. of 1:7 fresh steer serum, and 0.1 cc. of inactivated test serum or dilution were mixed in Wassermann tubes and incubated for 2 hours in a shaking machine at 37° C. In reading the tests, 0.01 cc. of each mixture was measured onto a slide and examined under a 22 x 22 mm. cover slip with the high dry objective.

In reading the tests, consideration was given both to the number of unagglutinated spirochetes per field, and to the proportion of organisms which were agglutinated. This is illustrated in table 3 which also shows a typical titer obtained on pool B, a positive human control serum. There were 20 spirochetes per field with no agglutination in the controls of antigen plus saline, antigen plus active or inactive complement, or antigen plus normal serum with active complement. In the control of heated complement and undiluted pool B, one-half the total number of spirochetes were unagglutinated, and one-half were agglutinated into

small clumps. This was designated as 2+ agglutination.

In the titer of pool B with active complement, there appeared to be complete disappearance of the spirochetes in the undiluted serum. In the 1:10 and 1:20 dilutions, there was 4+, or practically complete, agglutination with only one or less unagglutinated spirochete per field. The agglutinated organisms were contained in a few large, very tightly packed clumps which were usually located by searching the slide with the low-power objective. In the 1:40 dilution, there was an average of two single spirochetes per field, and 3+ to 4+ agglutination. The clumps in this dilution were less tightly packed, smaller, and more numerous than in the two preceding tubes. The 1:80 dilution showed 2+ agglutination with approximately one-half the organisms agglutinated in small- and medium-sized lacy clumps. In higher dilutions, there were 18 to 20 single spirochetes per field, and little or no agglutination.

At the same time pool B was run with fresh guinea pig serum which was active in the TPI test, and a titer only slightly higher than that without complement was obtained. Strongly positive agglutination occurred in the undiluted syphilitic serum after 2 hours' shaking, and in the 1:10 dilution after 23 hours' shaking. In the absence of shaking, agglutination occurred less rapidly with both steer and guinea pig complements.

Experiments were then set up to study the

mechanism by which fresh steer serum enhanced spirochetal agglutination. Pool B was titered as described above with fresh steer serum, with fresh guinea pig serum, and with fresh guinea pig serum plus 0.05 cc. of a 1:3 dilution of steer serum which had been heated for 30 minutes at 56° C. The tests were read after shaking for 2 hours at 37° C. In the titer with fresh steer serum, the 1:40 dilution of pool B showed 3+ agglutination; in the test with fresh guinea pig serum, only the undiluted pool B showed 4+ agglutination; and when tested with fresh guinea pig serum plus heated steer serum, 4+ agglutination was obtained in the 1:40 dilution. The control of undiluted pool B plus heated serum showed only 2+ agglutination. It seems clear from these results that the property of steer serum which enhanced agglutination was congenitally (4).

Using the technique with fresh steer serum, pool B has been titered a total of 24 times, with six different antigens. The reproducibility of the titers was well within the limits of technical error, and different antigens did not vary greatly in sensitivity. The dilution giving 3+ to 4+ agglutination ranged from 1:40 to 1:80 in 13 tests with 2 antigens, and from 1:80 to 1:160 in 11 tests with 4 antigens.

The specificity of the agglutination test is shown in table 4 which contains a comparison of the results of standard serologic tests (STS), TPI, and agglutination tests on serum from 154 presumably nonsyphilitic human donors. The

Table 3. Agglutination of *T. pallidum* in the presence of syphilitic serum and fresh steer serum
[Shaken 2 hours at 37° C.]

Tubes ¹	Single <i>T. pallidum</i> per field	Agglutination
1. Saline+saline.....	20/1	No clumps.
2. Heated steer serum (1:7)+saline.....	20/1	Do.
3. Active steer serum (1:7)+saline.....	20/1	Do.
4. Active steer serum (1:7)+normal serum.....	20/1	Do.
5. Heated steer serum (1:7)+pool B ² undiluted.....	10/1	2+ small and medium clumps.
1. Active steer serum (1:7)+pool B undiluted.....	0/25	Disappearance.
2. Active steer serum (1:7)+pool B 1:10.....	1/10	4+ tightly packed clumps.
3. Active steer serum (1:7)+pool B 1:20.....	1/1	Do.
4. Active steer serum (1:7)+pool B 1:40.....	2/1	3+--4+ clumps less opaque.
5. Active steer serum (1:7)+pool B 1:80.....	10/1	2+ lacy clumps.
6. Active steer serum (1:7)+pool B 1:160.....	18/1	Occasional small clump.
7. Active steer serum (1:7)+pool B 1:320.....	20/1	Do.

¹ Each tube contained a total volume of 0.3 cc. composed of 0.1 cc. antigen +0.1 cc. of each indicated reagent.

² Pool of positive human syphilitic serum.

Table 4. Results of qualitative serologic tests on presumed nonsyphilitic donors

Donors	Total	STS			TPI		Agglutination		
		Positive	Negative	Not tested	Positive	Negative	Positive	Negative	Doubtful
Medical students.....	46			46	0	46	0	43	3
PHL staff.....	29			29	0	29	0	29	0
Hospital patients.....	66	0	66	0	0	66	0	66	0
Hospital employees.....	12	0	12	0	0	12	0	12	0
Blood donor.....	1	0	1	0	0	1	1	0	0
Total.....	154	0	79	75	0	154	1	150	3

Donors included medical students, Venereal Disease Experimental Laboratory staff, hospital patients with diseases other than syphilis, hospital employees, and one blood donor. In DRL tests, there were no positives, 79 serums were negative, and 75 not tested. In TPI tests, there were no positives, and all 154 serums were negative. In the agglutination tests, there was one positive test, 3 doubtful reactions, and 150 negatives. The positive serum was obtained from the one blood donor, and the three doubtfuls, from medical students.

Table 5 shows a comparison of the results of STS, TPI, and agglutination tests on serum from patients with untreated primary, secondary, or latent syphilis. There were serums from 12 cases of darkfield positive primary syphilis. In STS tests, 8 were positive, 3 were negative, and 1 was not tested. In the TPI tests, 5 were positive, 6 negative, and 1 showed nonspecific immobilization. In the agglutination tests, 10 were positive and 2 negative. The serums from the 66 secondary and 33 latent syphilis patients were positive in all of the three tests.

A comparison of the results of quantitative

STS, TPI, and agglutination tests on serum from 15 patients with untreated primary, secondary, or latent syphilis is shown in table 6. Agglutination titers on the 10 positive primary serums ranged from 1:20 to 1:160. Agglutination titers on the 15 secondary serums ranged from 1:20 to 1:2560; and on the 15 latent serums ranged from positive with undiluted serum to positive in the 1:1280 dilution. There was no correlation between the agglutination titers of these serums and the TPI or STS titers.

The result of measuring the relative sensitivity of the TPI test and the agglutination test by another method is shown in table 7. Two-fold dilutions of syphilitic serums were made in saline, and these saline dilutions were then further diluted twofold in normal human serum, with similar dilutions in saline as controls. These second dilutions were tested quantitatively in the TPI and agglutination tests. It is apparent that dilution with human serum did not interfere with the antibody titration, and that the agglutination titer of the syphilitic serum was significantly higher than the TPI titer.

Table 5. Results of qualitative serologic tests on human syphilitic serum

Serum	Total tested	STS			TPI			Agglutination	
		Positive	Negative	Not tested	Positive	Negative	Nonspecific immobilization ¹	Positive	Negative
Primary.....	12	8	3	1	5	6	1	10	2
Secondary.....	66	66	0	0	66	0	0	66	0
Latent.....	33	33	0	0	33	0	0	33	0

¹ In tube containing inactive complement.

Table 6. Results of quantitative serologic tests on serum from patients with untreated syphilis

Patient No. and stage of syphilis	STS		TPI titers ¹	Agglutination titers ¹			
	VDRL titers	Kahn units					
<i>Primary</i>							
18821	1:64	256	>1:16	1:80	4+	1:160	2+
19529	1:16	32	1:5	1:80	4+	1:160	2+
19574	1:16	64	1:25	1:40	4+	1:80	2+
20495	1:8	16	Positive undiluted	1:40	4+		
20307	1:16	64	do	1:20	4+	1:40	2+
21279	Positive	1	do			Unsatisfactory. ³	
18415	1:64	512	Unsatisfactory ²	1:20	3+	1:40	2+
19521	1:4	16	Negative	1:40	4+		
20039	1:4	16	do	1:20	3+	1:40	2+
18588	1:4	8	do			Unsatisfactory. ³	
19538	1:2	8	do			Do.	
19884			do	1:40	3+		
20321	Negative	Negative	do	1:20	3+	1:40	1+
20073	do	do	do			Negative.	
20011	do	do	do			Do.	
<i>Secondary</i>							
19957		32	1:4	1:1280	3+	1:2560	2+
19307	1:32	64	1:4	1:640	3+	1:1280	2+
19639	1:64	128	1:8	1:320	3+	1:640	2+
19623	1:128	256	1:4	1:640	4+	1:1280	2+
19044	1:32	64	1:16	1:640	4+	1:1280	2+
21296	1:16	64	1:8	1:640	3+	1:1280	1+-2+
18520	1:16	16	1:90	1:80	3+	1:160	Negative.
18982	1:32	64	1:96	1:20	4+	1:40	2+
19354	1:32	128	1:9	1:80	3+	1:160	Negative.
19450	1:32	128	1:34	1:80	4+	1:160	2+
19591	1:8	64	1:64	1:40	3+	1:80	2+
18906	1:64	128	1:25	1:80	3+	1:160	2+
19762	1:16	256	1:125	1:40	3+	1:80	2+-3+
19793	1:64	256	1:125	1:640	3+	1:1280	-1+
19802	1:16	32	1:125	1:40	3+-4+	1:80	2+
<i>Latent</i>							
18794	1:32	64	1:8	1:320	3+	1:640	Negative.
18695	1:16	32	1:25	1:1280	3+	1:2560	1+
18567	1:8	16	1:16	1:320	4+	1:640	2+
19287	1:4	16	1:32	1:320	3+	1:640	2+
19065	1:32	64	1:16	1:320	3+	1:640	2+
19500	Positive	4	1:32	1:160	3+	1:320	2+
18905	1:2	2	1:4	1:320	4+	1:640	2+
18288	1:16	32	1:125	1:640	3+	1:1280	2+
18287	1:8	16	1:94	1:80	3+	1:160	1+
18481	1:32	64	1:75	1:80	4+	1:160	1+
18411	1:16	32	1:25	1:160	3+	1:320	-1+
18425	1:4	4	1:25	1:10	3+	1:20	2+
18582	1:32	128	1:25	1:40	3+-4+	1:80	2+
L. J.			1:2	Undiluted	4+	1:10	1+
18523	1:8	16	1:5	Do.	4+	1:10	1+

¹ Titers expressed as the actual dilution of serum tested.

² Unsatisfactory in TPI test. Serum showed nonspecific immobilization in control tube containing inactive complement.

³ Unsatisfactory in agglutination test. Serum too grainy and amount insufficient to centrifuge and repeat test.

Table 8 shows the results of TPI and agglutination tests on serums from patients with suspected biological false-positive reagin tests. A total of 69 serums was examined. In the

TPI test, 28 were positive, 15 negative, and 26 gave nonspecific immobilization which was not prevented by the addition of penicillinase (7). Of the 28 serums positive by the TPI test, 27

Table 7. Effect of diluting syphilitic serum in saline or in normal human serum on the sensitivity of the TPI and agglutination tests

Original dilution of serum in saline	TPI titers ¹ —Original saline dilutions further diluted in—		Agglutination titers ¹ —Original saline dilutions further diluted in—	
	Saline	Serum	Saline	Serum
1:2-----	1:4-----	1:4-----	1:80-----	1:80.
1:4-----	1:2-----	1:4-----	1:20-----	1:20.
1:8-----	Undiluted-----	Undiluted-----	1:20-----	1:40.
1:16-----	Negative-----	Negative-----	1:40-----	1:20.
1:32-----	do-----	do-----	1:10-----	1:10.
1:64-----	do-----	do-----	Undiluted-----	Undiluted.
Control of undiluted serum titrated in saline	1:8		1:160	

¹ Expressed as the actual dilution of serum tested.

were positive by the agglutination test, and 1 was negative. Of the 15 serums negative by the TPI test, 4 were positive by the agglutination test, and 11 were negative. Of the 26 serums giving nonspecific immobilization in the TPI test, 13 were positive by the agglutination test, and 13 were negative.

Discussion

A method has been described for enhancing the agglutination of *Treponema pallidum* in syphilitic serum by the addition of fresh steer serum. By means of this technique the presence of syphilitic antibody may be demonstrated in a specific test which is completed in only 2 hours. While it is not the object of the present paper to propose the use of this technique as a diagnostic test at present, it has certain obvious advantages over the serologic procedures currently used in the diagnosis of syphilis. Killed spirochetes are used as the

antigen, the antigens may be stored for periods of months in the refrigerator or at $-20^{\circ}\text{C}.$, and the materials could be made available to any serologic laboratory. Studies to date indicate that the agglutination test may have a specificity comparable with that of the TPI test. It also appears to have greater reproducibility than the TPI test, and several times the sensitivity.

The mechanisms involved in the reactions of *T. pallidum* with syphilitic antibody and steer serum are under continued study. It was shown in experiments reported here that the enhancing effect of fresh steer serum in the agglutination test was due to the presence of conglutinin (4). It was found in later experiments not described here that the disappearance of the organisms under the conditions of the TPI test was also caused by conglutinin. It is not yet known whether the disappearance of the spirochetes under the conditions of either the TPI test or the agglutination test is a result of lysis or of

Table 8. Results of TPI and agglutination tests on serum from patients with suspected biological false-positive reagin tests

Total serums tested	TPI positive—28		TPI negative—15		TPI nonspecific ¹ —26	
	Agglutination positive	Agglutination negative	Agglutination positive	Agglutination negative	Agglutination positive	Agglutination negative
69-----	27	1	4	11	13	13

¹ Nonspecific immobilization in tube containing inactive complement.

unusually strong agglutination. Although results with syphilitic serum absorbed with lipoidal antigen indicate that the agglutination test is probably not a measure of reagin, the identity of the antibody has not been determined. The possible identity of this agglutinating antibody with the TPI antibody (5) or other agglutinating antibodies (1-3) is now being investigated.

Summary

A study has been made of the effects of adding fresh steer serum to mixtures of *T. pallidum* and syphilitic serum. Because of its content of conglutinin, the steer serum caused disappearance rather than immobilization of the spirochetes under the conditions of the TPI test, and greatly accelerated and enhanced the clumping of the organisms in the agglutination test. The agglutination test performed by this method appears to compare favorably both in specificity and sensitivity with the TPI test.

ACKNOWLEDGMENT

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Venereal Disease Postgraduate Course

The 21st venereal disease postgraduate course will be held at Chapel Hill, N. C., from September 28 through October 2 under the co-sponsorship of the United States Public Health Service and the North Carolina University Schools of Medicine and Public Health. The course is open to all physicians. Applications for enrollment should be sent to Dr. Harold Magnuson, Director, Venereal Disease Experimental Laboratory, Box 687, Chapel Hill, N. C. The courses previously were held twice annually at the United States Public Health Service Medical Center at Hot Springs, Ark., until the center was closed last June.

American Medicine in a Changing Society

By OVETA CULP HOBBY

IRONICALLY, every advance of man seems to bring its own problems—the Greeks spoke of it as “cost of opportunity.” A changing medical practice and a changing society have presented us with an embarrassing number of what are paradoxically problems of progress. It is the solution of these problems which now concerns us all.

There is little controversy on the objective to be attained—the best medical care possible for people. It is the means to this end which raises the problems. One is the problem of supply. If we are to achieve our objective, the supply of medical care must be adequate and available to all the people. The second is the problem of using these medical resources under a policy which safeguards the traditional principles of our democratic American pattern.

Supply of Medical Care

The problems of supply we are facing include, first, problems relating to ways in which all the fruits of modern medicine can be brought within the reach of all the people. A vast array of new techniques of treatment involving costly equipment, costly medication, costly training, and the services of an army of ancillary personnel are now involved in the

problems of modern medicine. Although the doctor-patient relationship remains dominant, it is no longer a simple relationship. It has been complicated by the introduction of new specialties and factors, as well as by new emphasis on prevention of disease and renewed responsibility for the total health problems of the patient against the background of his situation. Modern medicine is not only complex, it is expensive to supply.

A second problem of supply relates to meeting the cost of research underlying these medical advances and continued progress. A third problem relates to the supply of physicians in the face of the mounting cost of medical education.

Use of Medical Resources

In the use of our medical resources, we must first be careful to work within the democratic principle. Democracy is a doctrine of free will, grounded on the demonstrated ability of man to judge his own individual and common interest on the basis of his common human experience. The freedom of man, therefore, to make his own choices is essential to human dignity, development, and progress. Hence, although man is a social animal and must act with his fellows to achieve the common goals of humanity—freedom and well-being—his right to self-direction must be safeguarded, in such social action, by the establishment of the social controls involved only with his active consent.

The touchstones of democracy are “freedom,” “consent,” and “individual responsibility,” not responsibility vested in an “elite” group with power to make choices and provide for the in-

The Secretary of Health, Education, and Welfare gave this address, here somewhat condensed, before the House of Delegates of the American Medical Association on June 1, 1953, during the 102d annual meeting of the Association in New York City. Her remarks are reproduced in full in the proceedings of the House of Delegates in the Journal of the American Medical Association, June 20, 1953, pp. 740-742.

dividual. In democracy, no one need walk alone, but he does his own walking.

Since we are pledged to the democratic private enterprise system as the system which creates the greatest opportunity for man's achievement of dignity and freedom, any policy which impairs its principles is regressive. The impairment of the principle of free choice and consent in medical care which is inherent in a compulsory program of medical care, therefore, represents a break in the fabric of our democratic system. This break occurs, moreover, in an area in which the value of the elements of "choice" and "consent" is intensified because of the very nature of the service involved. Under such a policy a long turn toward an authoritarian system would be made. The course of this social pathology is dangerously progressive and difficult to reverse.

Economic Considerations

It is clear that the democratic principle to which we are committed is not served by so-called socialized medicine. Such medical practice, moreover, not only violates the democratic principle of free choice and consent but is unsound from an economic point of view—the second principle involved in the use of our medical resources.

Democracy not only protects man's rights to free choice, it is the most economical form of social-political organization man has yet devised. For when the government provides a service, the cost of a round-trip ticket for the dollar from the taxpayer to the government back to the taxpayer must be paid. Hence, the interposition of the government between the doctor and the patient is expensive, and the total resources for medical care, research, and education are, at the last, reduced by the amount of this cost. This is the point which seems never to be fully recognized by those of socialist persuasion.

Equal Opportunity

A third principle which must govern the use of our medical resources is equal opportunity for medical care—the heart of our overall objective. Although in the short run it might appear that socialized medicine may achieve

this end, in the long run its involved and costly administration, its deadly effects on free inquiry and research, and its impairment of democratic rights to free choice ultimately defeat our long-view purposes of continuing medical progress and maintenance of the high standards of medical care which the American medical profession has achieved for this country under a private voluntary system. "Equality" of medical opportunity becomes a hollow victory under these conditions.

Socialized medicine is not a satisfactory solution of our problem. What are the alternatives? As a nation we cannot afford to fail to make available the best medical care possible to all our people. We must find ways to resolve the problems we set forth earlier.

Physicians' Responsibilities

This Administration is looking, first, to the physicians of the country for leadership in meeting this challenge, and we look with confidence.

The history of medicine is a record of devoted service to humanity. The American medical profession has long proved its devotion to these ideals. Its accomplishments constitute a proud record in medical history. The demands of today are only the continuing challenge in this long history of constant adaptation to a changing society, but never have these problems been more onerous and critical than today. I can put these issues no more clearly or forcefully than they were expressed by your president, Dr. Louis H. Bauer (1):

"I am afraid that too many physicians are indulging in wishful thinking that the clock can be turned back and that we can again practice medicine as it was practiced 25 years ago, without involvement in all these socioeconomic problems. It is idleness to believe that. These problems are upon us; our whole way of life has been altered, and, whether we like it or not, we cannot close our eyes to it. If we fail to participate and lead in the solution of these problems, the solution will be taken out of our hands, and that solution will not be a happy one. No problem can be solved well if those most competent to advise hang back and ignore it.

"So it is up to those of us who are active in the affairs of medicine to educate our colleagues and to stimulate their interest in what may be termed the nonscientific aspects of medicine. Unless we handle these nonscientific matters properly, the scientific aspects will suffer, too."

The Citizen and the Community

Second, this Administration looks to the individual citizen to meet his responsibilities: by making full use of resources made available to him through modern medicine for the preservation of his health; by prudent participation in prepaid plans for medical care; and by assumption of common responsibilities for the advancement of the health of our Nation.

Again, we have faith that the individual citizen will meet this challenge. His understanding of the meaning of the questions involved, however, should be widened. Under any plan he pays. He should learn more about what his dollar buys under a compulsory program administered by the government and under a private, voluntary system and what his democratic rights mean to him.

Third, this Administration looks to the community, acting both through its private voluntary associations and its governmental bodies, for help in meeting this challenge.

We are all familiar with the tremendous role of private foundations in the advancement of medical science in this country. It has been estimated that in 1951, philanthropic foundations such as Rockefeller Foundation, Ford Foundation, Commonwealth Fund, New York Foundation, Russell Sage Foundation, Guggenheim Foundation, and many others, contributed \$10 million toward the support of medical research; and voluntary health agencies, such as the American Cancer Society, Damon Runyon Medical Foundation, and National Foundation for Infantile Paralysis, contributed another \$10 million (2). The American Medical Association itself is a donor to causes of medical advancement.

Role of Government

Governmental bodies also carry responsibilities in working out plans of medical care which

meet our conditions and achieve our objectives. The role of government, particularly the Federal Government, is a basic question in our problem. This Administration believes that under a democratic system government has an important role to play.

The broad framework of this government responsibility was defined by President Eisenhower in his State of the Union Message last February when he said: "First, the individual citizen must have safeguards against personal disaster inflicted by forces beyond his control; second, the welfare of the people demands effective and economic performance by the government of certain indispensable social services."

The Department of Health, Education, and Welfare has been created to discharge these responsibilities of the Federal Government. These responsibilities may be broadly defined as those functions which serve the health of the Nation without affecting the doctor-patient relationship in medical practice.

Public Health and Research

The first area of concern is public health—prevention of disease; improvement of standards of sanitation in all areas, including food and drugs; and assistance and consultations to local communities in establishing and maintaining health services. The achievements of government at all levels cooperating with voluntary groups in advancing public health in these fields are too well known to recount.

Another appropriate area of government function is research. Although the achievements of private and voluntary organizations and groups in research have been phenomenal, the increasing scope of research, its cost, its basic and indispensable role in modern medicine make it a field in which government support is sought.

Rehabilitation

Another area in which the Congress has assumed an obligation for medical care is in the rehabilitation program—the restoration of the disabled. This is one of the areas in which private and voluntary medical services have worked closely with government agencies with success, and without prejudicing the principle of voluntary and private medical practice in a service administered by a government agency.

This type of service is a development in democratic society for the community care of those who are unable to provide essential services for themselves. This aspect of our problem is increasing and is becoming one of the underlying issues in the present situation. Because of tremendous advances in medicine, people are living longer and the incidence of chronic disease is increasing. The implications of these facts, and the problems they pose, are well understood.

Medical Education

There remains another area where the pressure of need is compelling a review of all possible methods of solution; that is the area of medical education, where the financial crisis is growing. A recent estimate, based on data accumulated by the Association of American Medical Colleges, shows that medical schools need approximately \$20 million a year to meet current inadequacies. The medical profession has begun to contribute substantial sums (nearly \$1 million to date) to the National Fund for Medical Education, organized to meet this emergency. In May, the fund reported that in addition to this money, corporate gifts amounting to \$570,882 had been received with an additional \$300,000 in sight. At best, only 10 percent of the amount needed is now available.

There must be a renewed drive for voluntary support of medical education and increased support by local governments, for these

problems of medical education cannot go unanswered.

The importance of government responsibilities in these areas is considered of such moment by this Administration that a position for a Special Assistant for Health and Medical Affairs has been set up in the Department of Health, Education, and Welfare.

A Partnership

In closing, let me quote again from Dr. Bauer (1): "We can solve our difficulties if all contribute by sound thinking, by looking forward, not back, and by constant striving toward an ideal that we shall never reach, because we shall steadily increase that ideal."

We already have patterns of cooperation and joint action set by years of close partnership between government, the people, and the medical profession. We can see the results of this partnership in every phase of our national health. We need only to push forward together to achieve a better health care for the people of the United States.

We have the resources. We have the will. We shall surely find the way.

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State and Territorial Health Officers' Conference

The 1953 annual conference of the Surgeon General of the Public Health Service and Chief of the Children's Bureau with State and Territorial health officers, State mental health authorities, and representatives of State hospital survey and construction agencies will be held from November 4 through November 7. Open sessions will be held in the auditorium of the Health, Education, and Welfare Building, Washington, D. C., November 5 and 7, beginning at 9:30 a. m. The remainder of the conference will be devoted to executive sessions and committee meetings.

THE CHILD

Educational Films

Educational films on child life are used as a group device for stimulating discussion of family relationships, child development, and the principles of mental health. Dr. Esther E. Prevey reports in the May 1953 issue of *The Child* that such films have been popular in the family life education program of the Kansas City, Mo., public schools.

About 100 groups of parents meet regularly there with parent-education leaders. When parents analyze the fictional family problems they see on the screen, they can talk freely without revealing some of their own problems. To get the maximum help from a selected movie, skillful leadership is needed to encourage and channel the informal group discussion.

Group leaders in Kansas City are guided by a memorandum on the use of films when they direct group discussion. For planning future meetings, they also record helpful information on a film evaluation sheet.

Dr. Prevey mentions two film lists on sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C. These are: "Mental Health Motion Pictures" (National Institute of Mental Health, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare; 124 pp.; 30 cents); and "Motion Pictures on Child Life" (Children's Bureau, U. S. Department of Health, Education, and Welfare; 61 pp.; 40 cents).

Social Casework in Camp

Mrs. Adelaide Z. Palumbo suggests that the trend is apparent that workers in health, education, social work, and camping are teaming up in children's camps. Those who

have worked together in privately owned camps and in organizational camps—the group workers, caseworkers, nurses, psychiatrists, psychologists, and education and recreation specialists—have found that camping is an untapped natural resource for dealing with the "whole child" and his family relationships.

Camp staffs do not yet include social workers, either group workers or caseworkers, although a camp gives service to the child much as does a child guidance clinic, a casework agency, or a neighborhood center. But caseworkers have already had some experience in placing children in camps because family agencies, children's agencies, and health agencies have been sending children to camp for years. Opportunities are present, too, for social workers to work in some camps as counselors, supervisors of counselors, and camp-intake and followup workers.

The children's camp lies within the competence of social workers and offers additional practical experience to work with children, which would be difficult to gain elsewhere. Significant trends in this direction are evident from developments such as these: A recognized school of social work has offered its first course in camping; a vacation association has created the first fellowship for advanced study in social agency camping. Social workers who are planning to work with families and children in casework, group work, or psychiatric agencies would do well to investigate the opportunities for experience offered by those camps which are authorized to give accredited field experience to social work students.

The Child is issued 10 times a year by the Children's Bureau, U. S. Department of Health, Education, and Welfare. \$1.25 a year (\$1.50 foreign mailing), 15 cents a copy, from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Sex Differences in the Trend of Mortality From Certain Chronic Diseases

By GENE KAUFMAN and THEODORE D. WOOLSEY

Differences in the trends of mortality among men and women for cardiovascular-renal diseases, ulcer of the stomach or duodenum, diabetes mellitus, and hernia and intestinal obstruction are examined. A similarity between the pattern of trends for the various age-sex groups in ulcer death rates and in cardiovascular-renal death rates is noted, and the implications of this similarity are discussed.

IN ANALYZING the trend of mortality from the major cardiovascular-renal diseases during the period 1920 to 1947, Moriyama and Woolsey (1) found pronounced differences in the trends for men and women. There was a marked contrast in the direction of the trends for white men and women between ages 35 and 65. Death rates for the major cardiovascular-renal diseases increased considerably among white men in these ages, while the corresponding rates for women were declining.

Various hypotheses have been suggested to

Formerly associated with the Division of Public Health Methods, Public Health Service, as a biostatistician in 1951-52, Mr. Kaufman is now with the Office of the Comptroller of the Army, Department of the Army, Washington, D. C., as a statistician and program progress analyst.

Mr. Woolsey, a biostatistician in the morbidity and health statistics branch of the Division of Public Health Methods since 1947, specializes in survey methods for the measurement of illness in the general population. He has participated in studies of mortality for the Division of Public Health Methods and in the past for the National Office of Vital Statistics, Public Health Service.

explain this phenomenon. Some of these are: differential effects of changing dietary habits upon the two sexes; differential effects of worry and personal tensions; differential effects of exercise or lack of exercise; changing patterns of urban and rural residence; and differing effects on the aging generation of men and women, which when young passed through the stress of World War I and the influenza pandemic of 1918-19.

While the explanation cannot be finally determined without a great deal of careful investigation, some light may be thrown on the subject by looking for other causes of death which exhibit a disparity in trend between the two sexes similar to that found for the cardiovascular-renal diseases. For this reason, death rates by age and sex for ulcer of the stomach or duodenum, diabetes mellitus, and hernia and intestinal obstruction are presented here for the two 6-year periods, 1921-26 and 1942-47.

The selection of 2 of these 3 causes of death for investigation was made because of the association which is known to exist between death rates for these diseases and 2 factors which may have something to do with the observed trends for cardiovascular-renal mortality. If one factor, tension and worry, played an

important part in the trends seen in mortality from chronic diseases of the heart, arteries, and kidneys, a similar pattern with respect to sex differentials might reasonably be expected to show up in the mortality for ulcers. On the other hand, diabetes death rates are known to be related to overweight. Consequently, finding trends of diabetes mortality which exhibited a disparity between the sexes like that seen for the cardiovascular-renal diseases would slightly strengthen the argument for overweight as an explanation of the latter. It was recognized, however, that diabetes was not an ideal selection from this standpoint. The introduction of insulin, which began to affect diabetes mortality in the middle of the 1920's, and, also, certain procedures in the assignment of primary cause of death may have modified the influence of changing proportions of overweight persons on the diabetes death rates.

Death rates for hernia and intestinal obstruction are probably not entirely independent of either of the two factors: tension and worry; and overweight (2). However, there is good reason to believe that their influence on mortality from this cause is very much less than on the two other causes of death. Hence, hernia and intestinal obstruction was chosen as a control for the other two, although "control" is not used here in the strict experimental sense.

Description of Method

The rates shown are for white men and women, ages 25-84, in the Death Registration States of the United States. (A time-series of death rates for the "registration States" refers to statistics which in a particular year are based on all States in the registration area in that year.)

The average number of deaths for each of the 4 causes of death in 3-year periods from 1921-23 through 1945-47 was first computed. This was done separately for each age and sex group shown in the table. Death rates were then computed on the basis of the estimated population for the middle year of each 3-year period. Because the trends for the entire 27-year span were observed to be essentially linear, it was concluded that a comparison of rates in two 6-year periods at the beginning and end of the inter-

val would serve adequately for studying the changes between 1921 and 1947.

The death rates specific for age and sex in the two 3-year periods 1921-23 and 1924-26 were therefore combined to obtain an estimated rate for the 6-year period, 1921-26. In a like manner, estimated rates for the period 1942-47 were computed. The age-specific rates for men and women in these two periods were then compared by means of ratios, the rate for the later period having been divided by the corresponding rate for the earlier one.

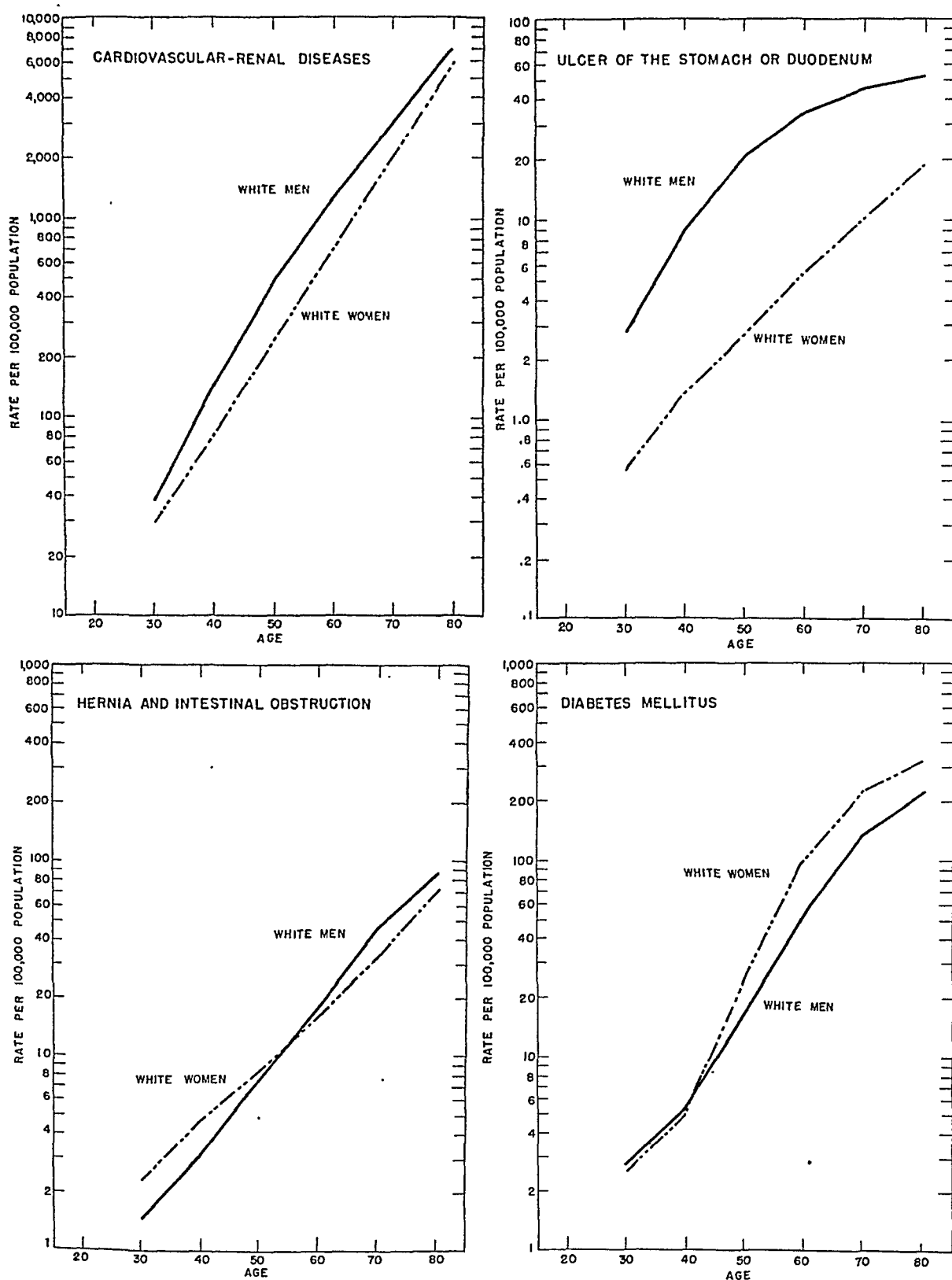
The study was restricted to the 27 years beginning with 1921 because the relative incompleteness of the death registration area prior to that time raises difficult questions concerning comparability of population groups. The death registration area did not actually cover the entire United States until 1933. However, by 1920 there were 34 States and the District of Columbia in the area which then contained 83.2 percent of the white population of the country. For a discussion of the effect of changes in the death registration area on trends of mortality for the cardiovascular-renal diseases, see reference 3.

Discussion

There are two disturbing influences that could alter the trends of mortality in the 27-year span, but neither one is believed to be capable of causing any serious distortion of the trends used in this study. One factor is the effect of changes in the number of States included in the death registration area. The other is the effect of periodic revisions of the International List of Causes of Death, which classifies mortality by cause. Increasing specificity in diagnosis and the improvement of medical knowledge of the nature of various diseases and their relationship to one another have made revision of the International List necessary.

However, the characteristics of the white population of the States in the death registration area from 1921 to 1933 differed only slightly from those of the entire country. Furthermore, the causes and groups of causes selected for examination were chosen because they were

Figure 1. Age-specific death rates for 4 diseases, 1942-47.



not seriously affected by the 1929 and 1938 revisions of the International List.

A more important consideration is the fact that the major emphasis here is on the comparison of trends for men and women. There is no reason to suppose that either of the above-mentioned factors would influence the trend for one sex in any way more or less than it would influence the trend for the other.

Age-specific death rates among white men and women for the major cardiovascular-renal diseases, ulcer of the stomach or duodenum, dia-

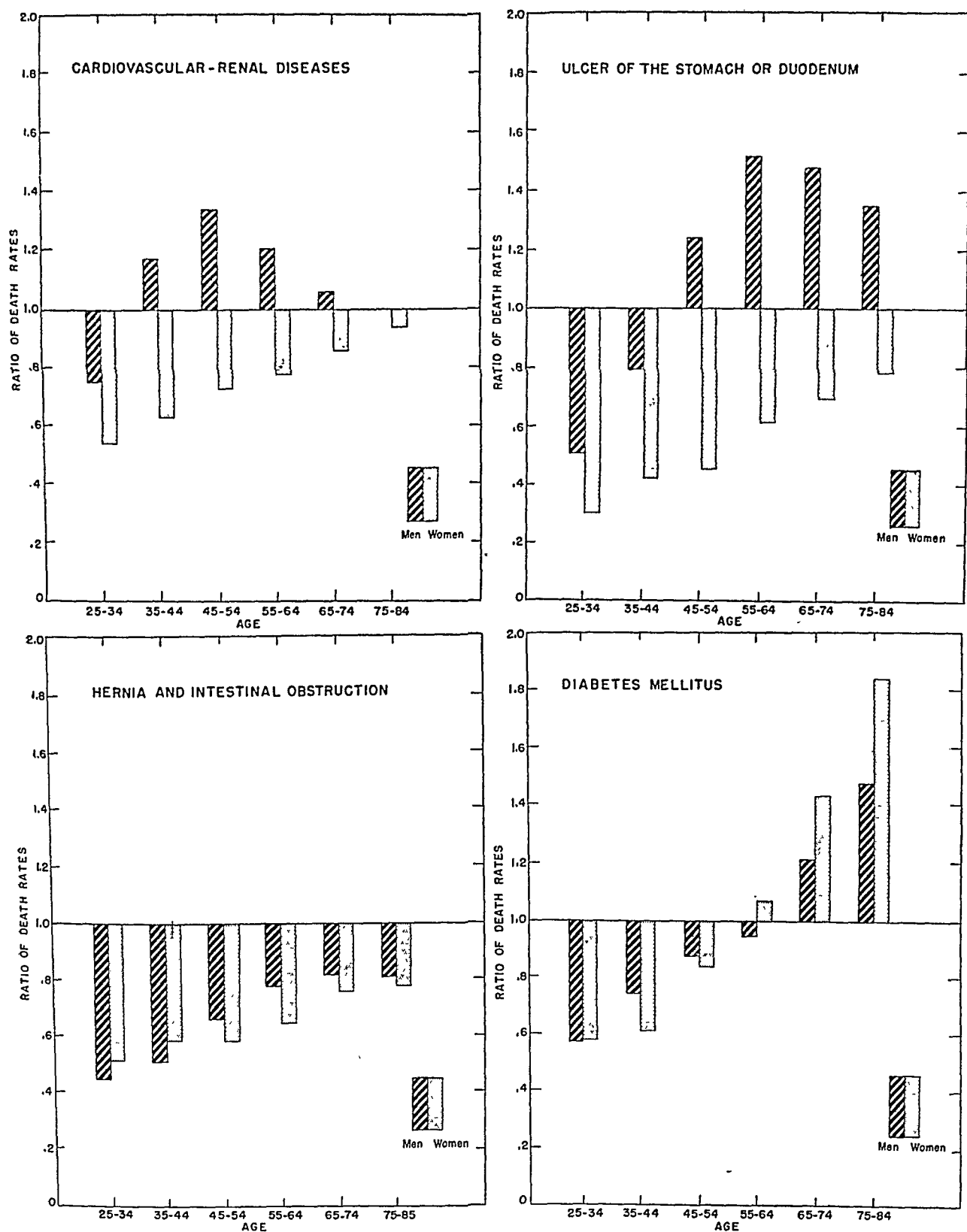
betes mellitus, and hernia and intestinal obstruction are shown in the table for the two 6-year periods, 1921-26 and 1942-47. The rates for the later period are also shown in figure 1 in which all four diseases are plotted on the same logarithmic scale to facilitate the comparison of relative differences between the sexes at the various ages. For each age and sex group, ratios of the 1942-47 rates to the corresponding 1921-26 rates are presented in the table and in figure 2. The same ratios are grouped by age in figure 3 so that the change in mortality for

Age-specific death rates per 100,000 population for 4 diseases among whites, by sex, for 1921-26 and 1942-47, and the ratio of the rates: United States Death Registration States

Age groups	Death rates				Ratio of rates 1942-47 to 1921-26	
	1921-26		1942-47			
	Men	Women	Men ¹	Women	Men ¹	Women
Cardiovascular-renal diseases						
25-34.....	48.3	53.6	36.2 (41.4)	28.9	0.749 (0.857)	0.539
35-44.....	123.1	127.7	143.7	80.4	1.167	.630
45-54.....	368.4	340.0	495.2	248.9	1.344	.732
55-64.....	1,052.9	894.5	1,271.1	702.1	1.207	.785
65-74.....	2,855.0	2,512.5	3,033.1	2,167.4	1.062	.863
75-84.....	6,918.6	6,328.9	6,907.8	5,973.6	.998	.944
Ulcer of the stomach or duodenum						
25-34.....	5.43	1.88	2.73 (2.90)	0.56	0.503 (0.534)	0.298
35-44.....	11.26	3.22	8.90 (9.03)	1.35	.790 (.802)	.419
45-54.....	16.69	5.97	20.70	2.71	1.240	.454
55-64.....	22.67	8.88	34.45	5.43	1.520	.611
65-74.....	30.05	14.82	44.56	10.24	1.483	.691
75-84.....	38.20	24.07	51.58	18.81	1.350	.781
Hernia and intestinal obstruction						
25-34.....	3.23	4.46	1.45 (1.55)	2.30	0.449 (0.480)	0.516
35-44.....	6.06	8.05	3.11 (3.15)	4.72	.513 (.520)	.586
45-54.....	11.68	14.57	7.80	8.57	.668	.588
55-64.....	23.46	24.91	18.30	16.23	.780	.652
65-74.....	49.68	44.64	40.69	33.99	.819	.761
75-84.....	105.54	90.92	85.75	71.03	.812	.781
Diabetes mellitus						
25-34.....	4.73	4.25	2.72 (2.90)	2.47	0.575 (0.613)	0.581
35-44.....	7.00	7.95	5.20 (5.28)	4.87	.743 (.754)	.613
45-54.....	18.83	28.92	16.53	24.36	.878	.842
55-64.....	55.28	92.36	52.59	98.92	.951	1.071
65-74.....	109.25	159.67	132.81	229.15	1.216	1.435
75-84.....	147.67	170.14	218.69	313.64	1.481	1.843

¹ Rates and ratios in parentheses are based on populations that do not include Armed Forces overseas.

Figure 2. Ratio of age-specific death rates in 1942-47 to corresponding 1921-26 rates, by disease.



the four disease groups among white men and women of a given age may be compared more easily.

It can be seen in figure 1 that the greatest relative excess in the male rate over the female rate for the cardiovascular-renal mortality occurs at ages 45-54. For ulcer of the stomach or duodenum, this maximum discrepancy occurs in the same age group. The largest relative discrepancy between the sexes for diabetes mellitus occurs after age 55, with women exhibiting the higher rate. It is apparent that the relative sex difference in mortality is very much greater for ulcer of stomach or duodenum than it is for the other three disease categories.

Age-Sex Patterns of Change

In both the cardiovascular-renal diseases and ulcers, the mortality among white women has been declining in the period studied, but the rate of this decline is consistently less with each succeeding age group from 25 to 85. Among men, there is a downward trend in mortality for both of these disease groups in the 25-34 age group. This downward trend changes to an upward trend in middle age, but beyond a certain age the rate of the increase declines. The greatest increase in the male cardiovascular-renal mortality is observed at ages 45-54, while at ages 75-84 there has been little or no change. In the ulcer mortality, however, the peak rate of increase among men is seen to be at ages 55-64. At later ages it decreases significantly, but the ratio of mortality in 1942-47 to that in 1921-26 does not drop back to 1.0 in the 75-84 age group as it does in the cardiovascular-renal group.

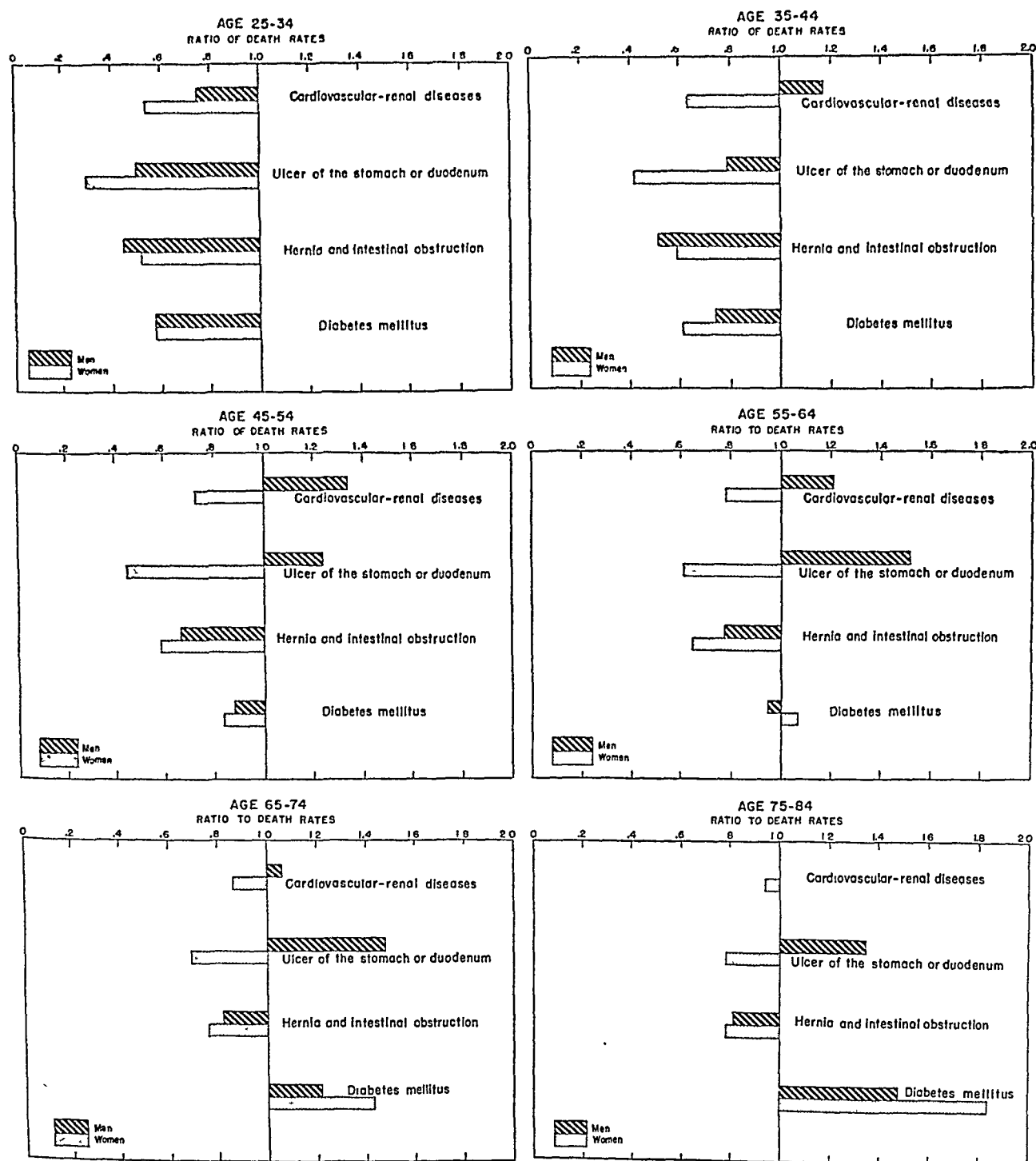
The pattern of change by sex and age for hernia and intestinal obstruction is quite different from that for the cardiovascular-renal diseases and ulcers. The pattern for diabetes is again different. Hernia mortality for both sexes has declined in all age groups although to a lesser extent in the older ages. With the exception of the first two age groups, 25-34 and 35-44, female mortality has decreased more rapidly than male mortality, but the difference between the trends for the sexes is very much less marked than in the cardiovascular-renal

diseases and in ulcers of the stomach or duodenum.

Diabetes mortality dropped about 40 percent in the 25-34-year age group during the 27-year span, but the picture with each succeeding age group appears less favorable. The mortality among the aged from diabetes is known to be heavily weighted with deaths of persons succumbing with the disease rather than from it. Although there has been an increase in the number of deaths from diabetes, the death rate of diabetic patients has definitely improved. As Dublin and Lotka point out (4), the probability of diabetes being diagnosed has greatly increased, and consequently, it is not at all surprising that the number of death certificates on which diabetes is mentioned has increased. Hence, the apparently unfavorable trend beyond age 65 is probably the result of the increasing life expectancy of diabetic patients. It is the sex differential in trend, rather than the trend itself with which this study is concerned, and here it is seen that after age 55 the trend for women is less favorable than that for men. Below age 55 the trend for men has been less favorable in 2 of the 3 age groups.

The pattern of change by age and sex for hernia and intestinal obstruction or for diabetes is not at all similar to that for the major cardiovascular-renal diseases. However, the similarity in the pattern of change for cardiovascular-renal and ulcer of the stomach or duodenum death rates is striking. This resemblance may be purely coincidental in the sense that the factors responsible for the changes in cardiovascular-renal mortality may be quite different from those producing the changes in the ulcer death rates. It is also possible that the same factors are responsible in both trends but that these factors have nothing to do with the etiology of the diseases. For example, there might have been an increasing opportunity for men to obtain a diagnosis of an ulcer or a heart condition—an opportunity which, for some reason or other, women were not getting. The evidence presented here by no means constitutes proof, nor does it even create a strong likelihood that tension and worry are the cause of the relatively unfavorable mortality among men of the later working ages.

Figure 3. Ratio of age-specific death rates in 1942-47 to corresponding 1921-26 rates, by age group.



However, this evidence should be taken into account in choosing the hypothesis for further investigation. More specifically, the similarity between the trends for cardiovascular-renal and ulcer mortality makes the investigation of the relationship between psychosomatic factors and

the cardiovascular-renal diseases a particularly promising possibility.

It must be emphasized once more that the differences between the rate of change in mortality for the sexes is of concern here rather than the magnitude of the rate of change itself.

Owing to the procedure employed until 1949 in assigning the primary cause of death for statistical purposes (5), the death rate did not always measure accurately the trend in the inherent risk of death from a given disease. This was particularly true of diabetes, since the former procedure for the selection of primary cause resulted in the assignment of many deaths to diabetes in cases in which this disease was listed by the physician as merely a contributory cause. An investigation conducted by the Metropolitan Life Insurance Co. in 1935 indicated that "53 percent of 3,519 deceased diabetic policyholders, for whom the facts were known, died from degenerative conditions of the heart, kidney, or arteries, 13 percent from infectious diseases, 4 percent from cancer, and 4 percent from tuberculosis" (4, p. 339). Yet, if diabetes had been mentioned on the death certificate in these cases, the death would have been classified as a "diabetes" death in the official death statistics for at least half of the cases. However, there is no obvious reason for supposing that

this factor would tend to operate differentially on the mortality for either sex.

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Closing of Two PHS Hospitals

Two Public Health Service hospitals—one at Cleveland and one at Fort Stanton, N. Mex.—are in the process of closing.

Closure of the Fort Stanton facility, a tuberculosis sanatorium, will be completed when its patients are transferred to other Service hospitals. Curtailment of operating funds for Service hospitals was the reason for the decision.

At Cleveland, the 190-bed general hospital has discontinued admissions. When its present patients, mostly veterans, have been discharged or transferred, an outpatient clinic will be established in downtown Cleveland. Emergency hospitalization for Service beneficiaries will be provided by contract arrangement at local hospitals.

Come-up Time Method Of Milk Pasteurization

By DENZEL J. HANKINSON, Ph.D., R. B. READ, M.S., WARREN LITSKY, Ph.D., and ROBERT R. BROWN, M.S.

CONVENTIONAL milk pasteurization treatment recognized by State and Federal statutes includes the vat method (143° F. for 30 minutes) and the high-temperature, short-time method (161° F. for 15 seconds). The high-temperature, short-time method has gained in popularity in the larger milk plants because of reduced space requirements and ease of application of regeneration (heat exchange from hot to cold milk). One disadvantage of the high-temperature, short-time method is the difficulty in accurately measuring and establishing the holding time at the short interval of a few seconds.

One solution to this difficulty is the elimination of the holding time, and hence the holding tube, by increasing the temperature to the point where only the "come-up" time will insure adequate pasteurization. This is the time required to heat milk to a given temperature. Studies at Cornell University in 1941 (1) indicated that this approach offers some possibilities.

In order that an adequate margin of safety may be established, standards should be based on a shorter come-up time than is possible with commercial milk heating equipment. Furthermore, since it is believed that any new definition of pasteurization should be based upon studies

with pathogenic bacteria, equipment that would permit such studies was designed. Basically, the equipment consists of a stainless steel pressure tank and small-bore stainless steel tubing. The tube is heated by high amperage, low voltage alternating current connected to the tubing at three or more points. This arrangement is illustrated schematically in the chart. Dimensions and operational data are as follows:

Capacity of pressure tank	5.0 gal.
Flow rate	5.75 to 11.5 gal. per hr.
Flow velocity	10 to 20 ft. per sec.
Reynolds number	3,500 to 7,000.
Air pressure required	30 to 120 lb. per sq. in.
Length of heating tube	2 to 10 ft.
Diameter of heating tube	0.065" i.d. × 0.125" o. d.
"Come-up" time, total	0.1 sec. to 1.0 sec.
Estimated time from final heating to collecting vessel (at 20 ft. per sec.)	0.025 sec.
Temperature rise, max.	170° F.
Rate of heating	170° to 1,700° F. per sec.
Operating voltage (a. c.)	0 to 15.
Operating amperage	0 to 1,200.

Results of preliminary studies have indicated that phosphatase is destroyed and that there is a 100-percent kill of a 24-hour culture of *Escherichia coli* within the range of 176° to 185° F. at heating rates varying from 170° to 1,700° F. per second. Flavor observations on milk heated to 200° F. indicated quality at least comparable to high-temperature, short-time pasteurization. Studies on pathogenic bacteria will be initiated after satisfactory operating ranges are established with the phosphatase test and with heat-resistant test organisms.

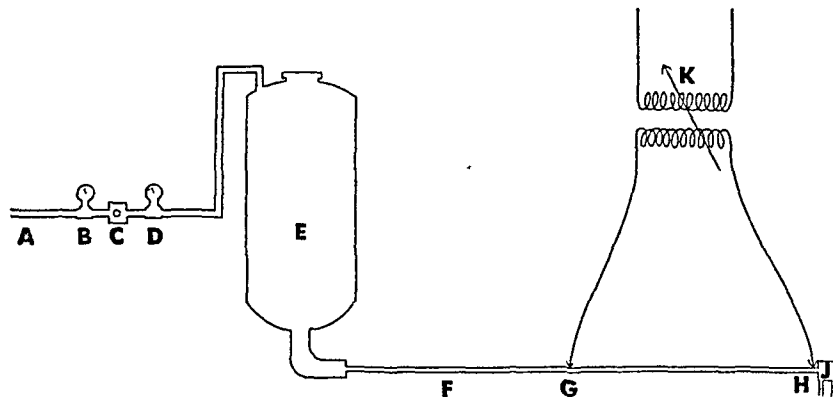
This method of heating in continuous flow, by which rates of flow and temperatures can be readily controlled, should permit the accumulation of reliable data on thermal destruction of enzymes, heat-resistant test organisms and, more important, on pathogenic bacteria, all of which are necessary before acceptance can be obtained for any process of importance to public health. Other applications could be found for the equipment in studying heating effects on fruit juices, wines, and other fluids in which controlled heating is required.

If these studies indicate that come-up time pasteurization is effective at temperatures less

Dr. Hankinson is with the department of dairy industry, Mr. Read and Dr. Litsky, the department of bacteriology and public health, and Mr. Brown, the department of electrical engineering, of the University of Massachusetts, Amherst, Mass. This investigation was supported by a research grant from the National Institutes of Health of the Public Health Service and is a contribution of the Massachusetts Agricultural Experiment Station.

Schematic diagram of laboratory apparatus for come-up time pasteurization

- A. Air line
- B. and D. Pressure gauges
- C. Pressure regulator
- E. Stainless steel milk container
- F. Stainless steel tubing
- G. and H. Adjustable connectors
- J. Dispensing apparatus
- K. Variable voltage transformer



than 200° F., it should be possible to apply the process with existing high-temperature, short-time equipment. The necessary alterations would be (a) elimination of the holding tube and (b) raising of the "cut-out" temperature for the flow diversion valve. The health inspector would no longer need to check both temper-

ature and holding time, only the pasteurizing temperature.

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Applications for Cancer Research Grants

Applications for new grants-in-aid for cancer research will be accepted before October 1, 1953, by the Committee on Growth, National Research Council. The grants will be effective July 1, 1954.

The Committee on Growth is acting for the American Cancer Society, which upon recommendation of the committee awarded approximately 250 grants totaling more than \$1.7 million during the past year. In addition to clinical investigations on cancer, the scope of the research program includes fundamental studies in the fields of cellular physiology, morphogenesis, genetics, virology, biochemistry, metabolism, nutrition, cytochemistry, physics, radiobiology, chemotherapy, endocrinology, and environmental cancer.

Investigators now receiving grants will be individually notified regarding renewal applications. Application forms and additional information may be obtained from the Executive Secretary, Committee on Growth, National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

Public Health Today— The Nation's Best Investment

By LEONARD A. SCHEELE, M.D.

PUBLIC HEALTH is a human institution. Unlike eternal truths, it is not "the same" yesterday, today, and tomorrow. Instead, it is dynamic, subject to change, and constantly changing. Even as we meet here this morning, "today" is rushing to become time past; and "tomorrow," to become time present.

Public health cannot afford to be the same today as it was yesterday, or as it will be tomorrow. For while we are thinking about public health today—while the clock ticks away the next half hour:

Forty people in the United States will die from cardiovascular diseases.

In the same 30 minutes, another 12 will die from cancer.

Five more will die in accidents.

That is the toll which these causes alone exact every half hour today—and will exact every half hour tomorrow.

If these facts are at once dramatic and sobering, consider this: For more than 1,750,000 Americans, this half hour will be the same as the last, and the next, and all the rest this year. These are the people of all ages whose diseases, injuries, or impairments disable throughout time. To many of them, death is not as difficult to contemplate as the ticking of the clock into the hours and days of invalidism ahead.

The Surgeon General's presentation was part of a symposium on "public health yesterday, today, and tomorrow" at the 22d annual meeting of the Southern Branch, American Public Health Association, in Atlanta, Ga., April 23, 1953.

Spur to Action

A consciousness of needless death and suffering has always given public health workers a sense of urgency in their planning and daily operations. We have, however, lost—or are losing—some of that strong drive, for our very successes have eased the spur in many of our programs.

Plainly, it is more difficult to feel the urgency of diphtheria immunizations in school health work today than it was years ago when the first active immunizing agents were developed and diphtheria outbreaks were an ever present spur. In malaria control, it is more difficult to retain a strong motivation for tracking down a dozen or so indigenous cases in a wide, sparsely populated area than it was barely 5 years ago to conduct a vigorous DDT program in the many communities with high malaria rates.

Some of you may recall the plea of William James that society develop a "moral equivalent for war," in order that man may exercise his aggressive drives without destroying himself. To paraphrase that proposal: In our public health work, we need a psychological equivalent for epidemics. Without some such spur, we run the risk of ignoring the need for vigorous action against the major health problems of our times, and of sinking into desultory performance of our customary activities. The public, observing the apparent ease with which old threats to life and health are controlled and being insufficiently aware of present threats, can be excused for questioning the necessity of its substantial investment in public health.

The whole array of protective measures against communicable diseases is so woven into the average American's life that he takes the benefits for granted. Epidemiological investigations, sanitation, licensing of biological products, and quarantine, for example, operate day by day with very few citizens, relatively speaking, being aware of their influence. Even case-finding, immunization, and treatment activities reach directly only a small proportion of the total population. To many people, public health work seems rather dull routine.

In the perspective of time past, time present, and time future, however, public health measures have had spectacular results. The average length of life in this country has increased 5 years since 1940; 8 years since 1930; and 19 years since 1900. A population gaining in longevity and general well-being finds it easy to overlook the indispensability of public health work, even in fields nearly conquered. In the light of the Nation's health gains, however, public health is our best investment.

Economics of Public Health

According to the most recent estimates, there are between 35,000 and 40,000 public health workers in official health agencies in the United States. Of these, 28,000 are professional and technical personnel providing some type of full-time local health service to 70 percent of the total population in the continental United States, roughly 106,000,000 people.

Although the Nation's investment in public health and related services has increased since World War II, expenditures for the promotion of health and the prevention of disease and disability still comprise a small proportion of the total health and medical care expenditures. Public health budgets also are small in comparison with budgets for hospital and medical care.

The American public is spending about \$14 billion annually for all types of civilian health and medical services. Expenditures for the conservative services—prevention of disease, promotion of health, and medical rehabilitation of the disabled—amount to only 6 percent of the total. The total expenditure for the conservative services, from all sources, is thus well under \$1 billion annually.

The implications are clear. Unless the health conservation services are sustained, unless health research is sustained, hope must be abandoned for any substantial reduction of the enormous burden that hospital and medical care imposes on all people—often when it is too late to bring the individual health or even life.

Public health and related services are relatively inexpensive. Public health progress has been achieved, in fact, through consistent search for, and development of, relatively low-cost techniques.

It is not so much the low cost of public health as it is its enormous returns in human and economic values that makes it a profitable investment. The results, however, do not show up as rapidly or as discretely as do the profits from investment in new products, for public health is dealing primarily with the human organism in its varied environments. It may take a decade or more to evaluate the economic gain from some important forward move in public health. Hence, in assessing public health today, we have to look back to yesterday.

Costs and Savings

Indeed, it seems but yesterday in these southern States when the most conservative estimate placed the economic cost of malaria alone at half a billion dollars a year. The intensive DDT program which lifted this burden from the south cost about one tenth of a single year's economic loss. There are few citizens today who do not credit malaria control with its contribution to the great economic advance of the southern States in the past decade. The campaigns against hookworm and pellagra belong to an earlier period, but these public health investments also have played a major part in the economic progress of the south.

Reductions in deaths and disability due to tuberculosis and syphilis are saving untold millions in dollars and in days of productive work. At the same time, improved infant and child health is assuring that a larger proportion of Americans will become productive members of our society.

Control of industrial health hazards, developed from continuing research and applied in

many of the Nation's industrial establishments, protects the majority of workers in the United States from occupational diseases. Prevention of accidents in industry, through safety devices and education, has reduced dramatically the death rates due to industrial injuries. The savings in productivity and compensation costs as a result of health and safety services in industry are incalculable. Some large industries, for example, have reduced the man-days lost from nonoccupational illness by 50 percent, with a concurrent decrease in sickness and accident payments of 35 percent.

Vocational rehabilitation programs, which include medical and hospital services when required, are returning more than 60,000 Americans to productive occupations annually, at a total cost of less than \$33 million. Before rehabilitation, the total annual earning of these people is about \$16 million. The first year after rehabilitation, their total income is \$116 million. A recent study shows that the cost of rehabilitating 376 families in West Virginia was less than the \$225,000 they had been receiving annually in public assistance. No longer dependent on public funds, these families are now earning about \$500,000 a year.

There are gaps in our current public health methods, it is true, but these gaps point up the tremendous importance of research. Since World War II, the United States has launched the most intensive medical research offensive in the history of our country or any other. This campaign is acquiring powerful momentum. The flow of findings predicted 5 years ago is now appearing. If continuity of medical research is maintained, substantial progress toward effective means of dealing with the chief killers and cripples of today is assured for tomorrow.

The potential gains to the Nation in better health for our people and in economic savings are stupendous. The investment required to maintain the current research effort and to extend it into unexplored fields, like the investment in public health and related services, is small when placed beside the Nation's expenditures for hospital and medical care, and still smaller when placed beside the costs of illness

and needless death in terms of lost productivity and dependency.

The Job Today

The investment in public health, though small in comparison with other expenditures, is substantial. Are we making the investment yield the best possible returns?

Many responsible health officials believe that we cannot answer that question without much more careful study of our programs and practices than is the general custom. Public health is a part of, and is influenced by, the great social and economic forces which operate in any dynamic civilization. It functions best when its leaders are alert to the changes occurring and when they take the initiative to keep public health practice responsible to the changing needs of the people.

We have a responsibility to see to it that the jobs given us to do are done with maximal efficiency; without needless duplication and expense, but with full attention to health needs. That is a large order in this day of rising prices and personnel shortages.

The major shifts in the causes of death and disability are familiar to all of us. The chronic diseases are becoming more and more significant as the population ages and the toll of acute infectious diseases is reduced.

Long-term disability due to chronic diseases is a heavy burden to the sufferer and a tremendous economic cost to the Nation. The chronicity and disabling effects of tuberculosis and syphilis have given public health workers striking evidence of this fact. Notable success against these two infectious diseases has been achieved during the past 10 or 15 years. However, tuberculosis deaths still cost the United States annually 1 million years of future working-life and \$350 million for hospital and medical care. Paresis in male patients alone costs an estimated annual loss of \$112 million in income.

In assessing our needs for personnel and funds, we must scrutinize our practices in every program and be prepared to concentrate our forces upon the most effective techniques. We must abandon techniques that careful evaluation studies reveal to be nonproductive. Many

public health practices which we have conceived as universally essential and universally applicable may have very limited value in dealing with the health problems of today as our social and physical environment changes. The basic skills of public health workers are, however, adaptable; what is wanted is the most effective utilization of those skills combined with the most effective utilization of the new instruments and agents flowing from scientific research and development.

Our past successes in public health have led many of us to believe that "more of the same" will accomplish results and that the public will continue to increase support on that basis. A popular song gives us the answer: "T'aint necessarily so!" Our task today, therefore, is to learn quickly how to spend better the funds for which we are responsible, whether they are derived from Federal, State, or local taxes, or from public subscription and private donations.

Chronic Disease Prevention

At the present time, a major strategic goal of public health is to strike at the roots of chronic disease by preventive methods. Preventive knowledge and methods in the field of chronic disease are such, however, that the practicing physician and the hospital have the major share in achieving this strategic goal of public health.

A basic problem in public health today, therefore, is to devise means whereby the skills of the private physician, the public health staff, and the hospital may become increasingly united for the prevention of disease and its disabling effects, and the promotion of health.

Our public health experience in syphilis control has given us valuable guidelines as to what is needed to bring about such effective utilization of resources. Medical science has provided both efficient laboratory tests to detect infection and remarkably effective therapies that can be administered by the general practitioner in his office, as well as by the outpatient department. Public health has developed effective case-finding and followup procedures, as well as other supporting services valuable to the physician. As a result, we can expect a continued decline in syphilis if the united efforts of public health

department staffs and private physicians are not relaxed.

This victory was not won overnight. It has taken more than a quarter of a century of co-operative research, of trial and error, of patience and persistence to achieve the present hopeful position in syphilis control. Even now we cannot say that we have all the answers, that there will be no further scientific or administrative advances in syphilis control. But we have developed methods which other programs may profitably emulate or adapt.

We have made a beginning in tuberculosis control, also; but case finding and therapy in this field, useful as they have been, have not attained a demonstrated efficiency comparable with that in syphilis control. Other chronic disease control programs, such as heart disease and cancer, are still in experimental stages. Although there are a few promising developments here and there about the country, effective preventive programs in these fields await new findings in basic and applied research.

The Community and Public Health

Responsible citizens in every walk of life have an intellectual interest in medical research and an intellectual concern that its vital mission be accomplished. But it is the public health services in the local community that command the emotional interest and concern of every citizen. The adequacy or inadequacy of local public health services has an immediate impact on each family, each individual.

More than ever before in history, public health today is the product of the local community. Unquestionably, the pioneer movement to stimulate local initiative in the prevention of disease is the most significant contribution of the public health profession to the Nation's welfare. The pattern of local health service has been developed by the profession and sometimes has been offered to communities for adoption with relatively little consideration of the tremendous social changes in this country, and of the shifts in population, in patterns of community life, and in health problems.

During the past 5 years, the United States Congress, after careful study, has not accepted proposals for specific, increased Federal aid to

local health units. This fact should stimulate the public health profession to analyze critically the lag in the development of full-time local health units.

The Congress represents and is responsive to the will of the people in health matters, as in other matters. There has been no lack of congressional interest in public health, and there is no lack today. The factors which operate to retard the development of local health units are many and complex. Let us consider briefly a few of the principal influences.

Since the end of World War II, the Congress has been faced with enormous financial demands upon the Federal Government. Nationwide concern has mounted, and with it has come a demand for increased State and local responsibility and independence in many domestic enterprises, including public health. Parallel with the increase in national and personal income, as well as in prices and taxes, there has been a growth and extension of Federal grants-in-aid to the States. The present system of Federal aid to the States is complex and involves many fundamental questions of governmental functions and fiscal responsibility. It is indeed a major problem in Federal, State, and local administration.

Federal-State Relations

Recognizing the seriousness of the problem and the necessity for rational solutions, the President of the United States has proposed—and legislation has been introduced in Congress—to establish a temporary Commission on Governmental Functions and Fiscal Resources whose major responsibility would be to study and make recommendations to Congress on the entire field of Federal activities in aid to State and local governments. Under the proposed legislation, the commission would be composed of 25 members: 15 to be appointed by the President and 5 each by the Senate and the House of Representatives. The commission would be expected to submit its report and recommendations in March 1954.

In a message to Congress on this subject, President Eisenhower, commenting on the national problem of Federal-State relations, said: "To reallocate certain of these activities between

Federal and State Governments, including their local subdivisions, is in no sense to lessen our concern for the objectives of these programs. On the contrary, these programs can be made more effective instruments serving the security and welfare of our citizens."

This is a statement of policy to which every responsible public health worker will subscribe. We must not wait, however, until the proposed commission has made its recommendations. We must begin now our studies of how our programs can be made more effective. As long ago as 1945, the Public Health Service pointed out that a larger share of the costs of basic health services should be borne by State and local governments. In general, this has occurred; but the major increase in State and local health expenditures has been in the fields of hospital and medical care.

I would urge the physicians, the health officers, and the citizens of our towns, counties, and States to work toward providing more financial support for the worthwhile old and planned new programs. Everyone should understand that the total financial obligations of the Federal Government, the current effort to bring the Federal budget into balance and ultimately to lower taxes, may well make it necessary to reduce Federal grants-in-aid to the States for public health work. Such a reduction should not be reflected in lessened service. The elimination of unnecessary and low priority projects, increased State and local appropriations, and greater voluntary support should more than balance any loss of Federal grants.

The continuing role of the Public Health Service will be to help the States with studies and demonstrations, or pilot programs, and technical leadership. We should all remember this basic principle of our democracy: Initiative and major action are the province and responsibility of the citizens and the States, free from any Federal paternalism that might destroy initiative in the public interest. We can expect that the Commission on Governmental Functions and Fiscal Resources will provide official agencies with an agreed, proper base for future Federal-State relations and Federal financial grants in the health field.

State and Local Responsibility

There should be substantially increased State and local activities in public health services—prevention of disease, environmental health, promotion of family and individual health, and medical rehabilitation of the disabled. This philosophy was expressed by the Hoover Commission when it reported: "The health of the Nation demands maximum employment of present scientific knowledge to control disease, and of research to find new methods for the prevention of disease. . . . The Nation's future can best be protected by using every means to prevent disease, rather than by providing unlimited hospitalization to treat it."

Until more State governments and legislatures and more local communities have adopted this philosophy, until they become zealots in its application, we can expect little progress in the further development of local health services. Public health workers as salesmen must also critically evaluate the product they wish to sell, in terms of the specific health needs and resources of specific communities.

It would be difficult to say, for example, to what extent our public health practices have been influenced by the truly remarkable advances in the prevention and treatment of acute communicable diseases during the past decade. Are our demands for laboratory procedures and public health nursing services in this field realistic? Are we providing services, once valuable, but no longer necessary? Improved technology in food production, processing, and distribution also challenge many of our standard sanitation techniques devised to protect us in earlier days. In the meantime, many serious needs remain unserved. Yet, we frequently base our estimates of costs and personnel required for local health services on the standard techniques that were defined 20 or 30 years ago.

Program Appraisal

The shortage of professional personnel in all categories is still acute. This statement, I realize, is growing a little shopworn. Thousands of speakers have made it from hundreds of platforms since the beginning of World War II. If we are not careful, it can become a dangerous

sedative to lull our awareness that we are doing so little to meet the personnel needs.

Our public health economists are the first to tell us that the available criteria for measuring "shortages" of personnel are far from specific. At best, such measurements afford us only a means for detecting the uneven distribution of health personnel. We have not yet developed sufficient scientific data on the effectiveness of specific techniques or on the functions and the performance of the different categories of professional workers to permit a completely realistic appraisal of our needs.

A few significant studies have been completed in the fields of hospital nursing and dental care. Others are in progress on the utilization of physicians' time in office and hospital practice. These point inevitably to the conclusion that many of our difficulties in staffing could be overcome by more efficient utilization of personnel in "scarce" categories, by increased use of less scarce personnel in related professions, and by increased use of well-trained, nonprofessional personnel.

During the past year, the Public Health Service attempted to develop a study of the amount and kinds of nursing service required to meet the minimum needs of local health departments. We found that studying the needs of a single type of service is not enough. Nor is it enough to study the needs for other types of personnel. We must have broader studies, aimed at determining the types of organization that will be most effective in meeting the health needs of different types of communities. On this basis, staffing requirements can be assessed efficiently.

Many local health organizations as now constituted cannot cope with today's problems—with the chronic diseases and impairments, with the health needs of the aging, with the chemical environment, and similar problems of contemporary society. Newer programs have been initiated to deal with some of these problems, but they do not always fit into the traditional structure of local health organization.

If public health tomorrow is to be a more effective instrument for service to the community, we must be vitally concerned today with appraisal of our current programs and

practices. We must be vitally concerned that the methods we propose are adaptable to the needs of different types of communities. Local health organization is indispensable and it must be strengthened—if tomorrow's health is to eclipse that of today. But public health must learn new ways of organization as well as new operating techniques in order to develop the kind of local health service that will meet tomorrow's needs.

Conclusion

Public health today is a part of public health yesterday and of public health tomorrow. Yet, tomorrow public health workers of all categories will be facing many of the same routine tasks. There will be the usual backlog of work, with additional tasks arriving every hour. There will be the same problems of staffing and recruitment; the same questions, seemingly unanswerable, about how to do today's job without

enough people and money. There will be little time to step back and think.

Somehow we must find time for reflection. Public health today is in a period of transition: a period in which we may see a realignment of the sources of financial support and of the functions of many organizations engaged in public health and related services. Yet, this can be one of the healthiest periods in the history of organized public health services. For if the public health profession responds to the demands of today with full exercise of the scientific method in which we have been trained, rather than with emotional attachment to the tasks of the moment, we can vastly improve our operations; bring the influence of preventive medicine and environmental health to bear upon related services; and extend the tested techniques and skills of public health into many fields still awaiting cultivation. This task is at once the task of public health today—and tomorrow.

Public Health Service Staff Announcements

Elisabeth Boeker, Public Health Service nurse officer, is the first nurse to be sent to Iraq under the Point IV technical aid program. Miss Boeker will work with Iraqi nurses and other health aides to assist in developing public health nursing services in that country. She will advise the Iraqi Ministry of Health on nursing matters. In Basra she will help organize the nursing section of a new local health department and train public health nurses.

Margaret E. Benson has been appointed chief of infectious and tropical disease nursing of the Public Health Service Clinical Center at the National Institutes of Health. Miss Benson has served in various staff nursing and instructional capacities at the Minneapolis General Hospital

and the University of Minnesota School of Nursing. Since 1951 she has been special consultant to the Division of Nursing Resources, Bureau of Medical Services, Public Health Service.

Meral Loewus, a Public Health Service nurse officer, has been assigned to the Technical Cooperation Administration Mission to Iran where she will direct nursing education at the Nemazee Hospital of Nursing in Shiraz. The hospital, scheduled to open next year, is being built by the Iran Foundation, and the mission is helping provide staff members until their Iranian counterparts can take over. Miss Loewus will work with Iranian nurses in setting up the new school of nursing. Until recently, she was associate professor in the department of nursing at Montana State College.

Community

Fly Control Operations

16 mm., sound, black and white, 12 minutes, 1952.

Audience: Sanitarians, entomologists, public health personnel, and students engaged in or interested in community fly control.

Available: Loan—Public Health Service, Communicable Disease Center, 50 7th St. NE., Atlanta 5, Ga. Purchase—United World Films, Inc., 1445 Park Ave., New York 29, N. Y.

A successful fly control project as carried out in a typical town is shown in this film, designed to educate the residents of a community in fly control and to gain their support in the project.

The film presents a basic plan of attack that can be used to control flies in any community—education, sanitation, and chemical control.

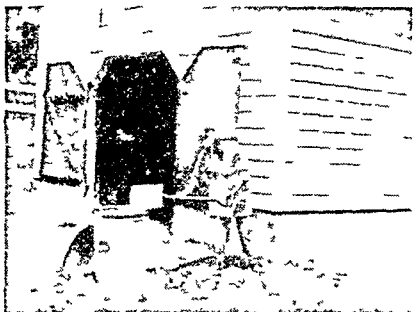
These three measures are developed in the film by showing the procedures carried out by visiting State fly control specialists, local public health and municipal officials, and residents. The community is surveyed to estimate the number of flies present. The main fly breeding sites—exposed garbage, animal shelters and waste, industrial waste, and insanitary privies—are located. Residents are shown how they can aid in eliminating some of the fly breeding sites. Help is given city officials in solving the more expensive municipal problems of fly control.



Fly control supervisor carries education program to schools.



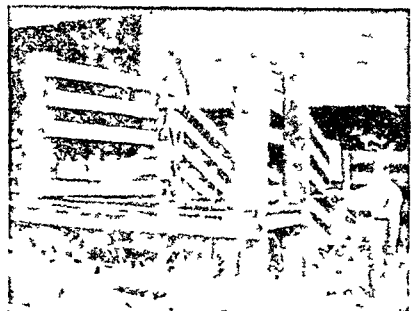
Community fly control supervisor advises mayor's committee on major municipal problem (open garbage dump).



Citizens' response to educational program—keeping animal waste in containers in privately owned animal shelters.

Insecticides are used for immediate relief and as a supplementary measure in the difficult problem areas, but basic sanitation is emphasized as a necessary factor in the permanent control of flies.

These measures, the film points out, will control fly problems but will never completely eliminate them. Routine vigilance must be continued indefinitely by making periodic fly counts, by keeping a check on possible breeding sites, and by using insecticides to combat occasional small outbreaks



Fly problem site (stockyards) treated with residual spray.

Swimming Pool

Sanitation

35 mm. filmstrip, sound, color, 8 minutes, 1952

Audience: State training officers, sanitarians, and others interested in desirable swimming pool characteristics and operational procedures.

Available: Loan—Public Health Service, Communicable Disease Center, 50 7th St., NE., Atlanta 5, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.



Rapid gravity filters.



Cleaning pool.

This filmstrip shows some of the physical characteristics and the operating procedures basic to swimming pool sanitation.

Planning and construction: details size considerations, ratio of deep to shallow water area, overflow gutters, desirable provisions for recirculation type pools, units of the recirculation system, and several different filter methods.

Operation: includes provisions for operation such as dressing rooms, scheduling of sanitary operations, emergency preparations for breakdowns, and bathhouse maintenance.

Half a Century of International Control Of the Venereal Diseases

By THEODORE J. BAUER, M.D.

IN INTERNATIONAL negotiations to develop acceptable quarantine regulations, with which the international health movement was primarily occupied for many decades, venereal disease was of little importance. It was cholera and plague, smallpox, yellow fever, and typhus which engaged the principal attention of governments in their dealings with one another on health questions. Until after 1910, emphasis in international discussions of syphilis was often placed upon its social rather than its medical aspects, partly, perhaps, because of the poverty of preventive and therapeutic knowledge.

By the time the Health Organization of the League of Nations came into being, however, knowledge of the diagnosis and treatment of this disease had grown enormously. And as broader collaboration in health matters developed among nations, syphilis came to be recognized as a widespread and serious health problem. The Health Organization established an expert committee on syphilis, and from this group stemmed much of the useful work sponsored by the League in studying and standardizing certain venereal disease control procedures and techniques developed in the first decades of the 20th century.

In a somewhat different area, the International Union Against the Venereal Diseases also

began its work in the years just after World War I. At this time, many nations began campaigns and programs against venereal disease, employing varied methods and approaches. The International Union has attempted to foster these programs and to generate support for venereal disease control nationally and internationally.

Both of these organizations, the League and the International Union, participated in a movement to provide venereal disease control services for merchant seamen. The result of this movement was the Brussels Agreement of 1924, a landmark in international venereal disease control and still an effective instrument for providing venereal disease treatment facilities for seamen.

Since World War II, the keystone of international venereal disease control has been the venereal and treponemal disease program of the World Health Organization. The modern concept of international health efforts, that of assisting nations to improve health services and conditions internally, has been given broad application in the venereal disease program, which includes training of personnel, provision of demonstration teams, exchange of scientific knowledge, and mass application of antibiotic therapy in areas of high treponemal disease prevalence.

Antiquity of Syphilis

One of the classic controversies of medical history centers about the origin of syphilis: Whether it was brought to Europe from the New World at the close of the 15th century or existed there in antiquity. Whichever theory is correct, syphilis apparently was present in Europe

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at least by 1495. An epidemic of the disease in malignant form is usually said to have swept the continent at about that time, striking first in France, Spain, and Italy, and spreading quickly to Germany and Switzerland. Holland, Greece, and England knew it in 1496; Hungary and Russia in 1499. It is said to have ranged to the Far East early in the next century (1, 2).

Some writers believe that instead of a virulent syphilis racing across Europe after 1493, one or several infectious diseases, perhaps in combination with syphilis, were confused with and designated as the latter, thus giving rise to the "epidemic of syphilis" theory so often cited (3).

If the epidemic of about 1500 was indeed syphilis, the disease began to change within the following 50 years and has not since assumed the same violence and rapid fatality. Probably because it did not compare in virulence with such diseases as cholera and plague, syphilis did not figure prominently in later discussions of quarantine regulations designed to prevent the spread of disease from country to country (4-6).

Collaboration in Health

Nevertheless, in the 19th century particularly, debates and negotiations among nations on the subject of quarantine indirectly affected the development of international venereal disease control measures.

The 19th century was a time of progress in shipping and transport and consequently of growing trade and travel. Nations were drawn into closer and more diverse relationships, creating common problems calling for cooperative action. Yet, machinery through which national spokesmen could debate or act together on technical matters was lacking. In this situation, nations turned to the international conference. "When a problem became particularly acute," says Boudreau (7) of this period, "a government took upon itself the responsibility of calling an international conference . . ." The French Government called the First International Sanitary Conference in 1851, primarily to thrash out problems of quarantine and to seek unity in the prevention of cholera and plague. This conference represented the beginning of cooperation among nations in the field of health

and sanitation. In the next half-century, a score of conferences dealt with typhus, smallpox, and yellow fever as well as cholera and plague, and in 1907 the Office Internationale d'Hygiène Publique was established as a permanent international health office, concerned chiefly with enforcement and revision of the international sanitary conventions (6, 8, 9).

Once established, the principle of collaboration in health matters never died. Eventually, it was applied to the problem of venereal disease.

Approaches to VD Control

Before 1910, many countries confined their syphilis control efforts to regulation or repression of prostitution. Internationally, likewise, when venereal disease was discussed it was often closely identified with broad social issues rather than with health *per se*.

Yet, the importance of syphilis as an international health problem began to emerge at least toward the end of the 19th century. In 1899, an International Conference on the Prophylaxis of Syphilis was held at Brussels; in 1902, a second conference on the same subject, also held at Brussels, recommended among other things free treatment for all persons infected with venereal disease and distribution of leaflets emphasizing its dangers to persons entering the armed forces. Various groups, for example, the League of Red Cross Societies, the International Labour Office, and the International Union Against the Venereal Diseases, later held meetings which approached venereal disease as either a medical or a social problem or both.

The latter organization, the International Union, merits a special word as a voluntary organization with a continuous record of service. After World War I, many countries began campaigns against venereal disease; approaches and methods varied, however, and results were uneven. Speaking in 1928 of the disparity in modes of attacking the venereal disease problem, Professor A. Bayet of Brussels, first chairman of the International Union Against the Venereal Diseases, said (10): ". . . some countries . . . concentrate on the social effects . . .; others concentrate on individual treatment, aiming above all at the cure of the patient himself; others place their trust in laws and regulations, and others, without having any definite



Pan American Sanitary Bureau photograph

WHO photographs

(Left) Collecting blood samples in Itaugua, Paraguay, during anti-VD campaign, 1952. (Center) Centrifuging blood samples in the field (WHO Simla, India, VD Program, 1949). (Right) A nurse in one of the teams fighting endemic syphilis in Bosnia making a blood test.

programme, do what they can here and there without any unified plan."

This diversity in methods of attacking the venereal disease problem led to the foundation of the International Union Against the Venereal Diseases. At a series of conferences organized in 1921 by the League of Red Cross Societies to discuss venereal disease, the need became apparent for establishing a forum where varying viewpoints could be aired and a measure of uniformity sought in national approaches to venereal disease control. Founded in 1923, the International Union has sought since its earliest days to aid countries represented in its membership in developing sound principles of venereal disease control. This organization has also performed useful service in publicizing venereal disease control and in stimulating public support of control efforts (10).

League of Nations

With creation, following World War I, of the Health Organization of the League of Nations—with greater resources and broader functions than the Office Internationale d'Hygiène Publique—potentially effective machinery was established for a sustained global attack on health problems. The Health Organization began operating in a world where international health involved many questions other than quarantine. Among the problems faced by the young organization, for example, was that of standardizing many of the new "biologicals" and the procedures which advances in the medical sciences had produced (8).

Responsive to these new factors, the Health Organization of the League of Nations undertook early in its history to establish international standards for serums, biological products, and serologic reactions. Standardization was needed not only in performing serum tests for syphilis but also in interpreting and recording test results. The Health Organization of the League of Nations arranged conferences of experts in 1921, 1922, and 1923. The latter meeting and subsequent gatherings in 1928 and 1930 were working laboratory conferences, which evolved many valuable rules of serologic testing.

Standardization of antivenereal disease drugs was also part of the Health Organization's program, which embraced both arsenicals and penicillin. Provisional standards for the latter were established in 1944 (8).

Syphilis therapy also was studied. By the time the Health Organization came into being, arsenical treatment had gained wide acceptance among physicians. Various schemes and dosages were employed, however, and as Vonderlehr and Heller (11) have put it, "Almost every doctor who attained a scientific reputation in the treatment of the venereal diseases had his own plan for use of the arsphenamines." Beginning in 1928, through the agency of a Commission of Experts on Syphilis and Cognate Subjects, the Health Organization undertook an extensive inquiry into methods of treating syphilis with the arsenicals. More than 25,000 case records from clinics in Germany, Denmark, France, the United Kingdom, and the United States were analyzed. Results of the study, re-

ported in 1934, engendered widespread interest among health administrators and syphilologists.

The Brussels Agreement

The most specific accomplishment in international venereal disease control before World War II was the Brussels Agreement of 1924. The moving forces behind this convention, designed to provide venereal disease treatment facilities for merchant seamen, were the Health Organization of the League of Nations, the Office Internationale d'Hygiène Publique, the International Labour Office, and the International Union Against the Venereal Diseases. The agreement calls for maintenance of venereal disease treatment services for seamen and watermen in the ports of signatories. This occupational group, seamen and watermen, moving from port to port and particularly subject to exposure to venereal infection, had long been looked upon as an important factor in VD epidemiology.

The Brussels Agreement was an attempt to deal with this problem in a straightforward manner. Signed on December 1, 1924, by 1938 the convention was ratified or adhered to by 56 nations, dependencies, special ports, or island groups. In practical terms, its purposes have been effectuated somewhat more broadly than the number of its adherents would indicate. For example, the United States is not a signatory; but, after passage of the Venereal Disease Control Act of 1938, foreign seamen have been permitted to obtain treatment for venereal disease in clinics organized under the act, and the clinics themselves have been included in the International Treatment Center List provided for by the agreement (12, 13).

VD Control Before World War II

In a narrow sense, the record of international venereal disease control before World War II shows but few enterprises of substantial importance. Probably most valuable were the Brussels Agreement and the trailblazing done by the League of Nations in cooperative studies of syphilis serology and treatment. Beyond these specifics, however, lies the maturing of the whole concept of cooperative attacks on disease. In its modern form this concept involves the building up of an effective program

of health and disease control in each nation of the world. This approach was first demonstrated by the Rockefeller Foundation, which has worked effectively since 1913 toward developing cooperative action in the health field (14, 15).

To implement international cooperation as it applies to venereal infections, the early years of the 20th century produced the diagnostic and therapeutic processes which make possible the medical control of syphilis—demonstration of *Treponema pallidum*, development of the serologic test, use of the darkfield procedure in diagnosing early syphilis, and the enormous contribution of Ehrlich, salvarsan. There are, of course, a host of other factors—social, political, ethical, medical—which influence the international health movement. But those are far beyond the scope of this paper.

Principles for WHO Program

In the recommendations of the Interim Commission of the World Health Organization to the First World Health Assembly, held in Geneva in 1948, venereal disease control was among the programs assigned top priority. In selecting priorities, three principles guided the Commission (9): The worldwide or regional importance of the problem; the possibility of effective international action; the increased urgency of the problem as a result of war.

While there were no statistical guides by which the extent of the global venereal disease problem could be precisely assessed, data were adequate to establish the high prevalence of this group of infections and the aggravation of the problem as a result of the war. There was ample cause to believe that an international venereal disease program could be successful. Newly introduced methods of treatment, particularly penicillin, had removed many of the drawbacks of older forms of therapy; furthermore, the Interim Commission considered that, on the basis of past international experience in the field, renewed action against venereal disease was feasible. Thus, venereal disease control fitted well into the WHO plan of concentrating its initial efforts on "impact" programs. The First World Health Assembly accepted the priorities recommended by the Interim Commission, and authorized establish-

ment of expert committees in the priority areas (8).

WHO's venereal disease control program has been broadened since 1948 to encompass non-venereal treponematoses (yaws, pinta, bejel). At first, the Expert Committee on Venereal Disease, mindful of its terms of reference, had recommended against bringing bejel and related spirochetoses within the scope of WHO's venereal disease control program. Although the committee recognized that these diseases merited the attention of WHO, it felt that because of the "predominantly nonvenereal nature of these conditions" (16) they should constitute a separate activity of the world organization. Later, however, noting the "demonstrated uniform response of various treponematoses" to penicillin (13), and other technical and administrative considerations, the committee gave its approval to the broader program. The Second World Health Assembly (1949) decided that an expert group on treponematoses should be established under the program projected for 1950. Following the favorable attitude of the Expert Committee on Venereal Disease as to combining treponematoses (in addition to syphilis) with the venereal disease control program, the Executive Board of WHO approved the merger of the two expert groups. The enlarged committee held its first meeting under its broadened terms of reference in August 1952.

Criteria for Broadened Program

The content and accomplishments of WHO's venereal disease and treponematoses control program are described in WHO publications and elsewhere, and no attempt will be made here to analyze them in detail. However, because this program stands at the center of today's international attack upon venereal infections, a few of the chief premises on which the program functions will be summarized:

1. WHO's approach to venereal disease control is one of public health. At its first session, the expert committee (17), while recognizing the "vast social implications of venereal disease," suggested that WHO concentrate on the public health and medical aspects at least "until definite plans on . . . social aspects . . . now under consideration by the United Nations

and other international organizations become available."

2. One of the objectives of WHO's venereal disease control program is to help member countries establish and develop permanent control structures within national health administrations. Emphasis is placed on underdeveloped areas of high venereal disease prevalence.

3. Assistance in training venereal disease control personnel is supplied through fellowships and demonstration services and through support of training institutions in areas where facilities are limited. Demonstration teams and other phases of WHO's training program in venereal disease control are conceived as beginning points from which not only national venereal disease control programs but also broad public health programs can ultimately develop (13).

4. Efficient serologic testing for treponematoses is a prime requisite of an effective venereal disease control program. WHO's interest in serology is epitomized by the establishment of a Subcommittee on Serology and Laboratory Aspects (of the Expert Committee on Venereal Infections and Treponematoses) which is actively pursuing the ideal of worldwide standardization of serologic procedure, technique, and reporting of results in serum tests for treponematoses. Both the parent group and the subcommittee have emphasized the advantages of the cardiolipin and lecithin antigens in serologic testing. Through the cooperation of the Expert Committee on Biological Standardization, international reference preparations of these antigen components have been deposited with the Standards Department of the State Serum Institute, Copenhagen, and a standard description of them has been included in the International Pharmacopoeia. Several countries in Europe have begun to produce these substances, and there are plans for similar steps in Southeast Asia and in the Americas (in addition to the United States, where cardiolipin and lecithin antigens were first developed) (17, 18).

5. Penicillin therapy is in general use in WHO-sponsored programs of treponemal disease control. While the problem of penicillin production and distribution was separated from the venereal disease program by the First World Health Assembly, the expert committee has

watched the subject with great interest and concern. In fact, at its second session in 1948 the committee observed that in its opinion (16), "... the limited availability of penicillin [was] the outstanding restricting factor in venereal disease control in the world today." The economic commissions of the United Nations and WHO have worked together to stimulate production of penicillin, and the antibiotic is becoming somewhat more accessible for worldwide use. A Section on Antibiotics has been created within the WHO Secretariat, reflecting the importance with which this subject is viewed within the organization (13).

6. One of the great needs of the world in venereal disease control is the exchange of scientific information on venereal disease among professional workers. To aid in meeting this need, WHO has prepared a number of technical documents from data collected from many parts of the world. Another manner of meeting this need is through international meetings of experts and other workers. For example, in 1950, an International Symposium on Syphilis was held in Helsinki, Finland, through the cooperation with WHO of the Finnish and French health administrations. In March 1952, the First International Symposium on Yaws was held in Bangkok, in an effort to draw together the experience and thinking of professional workers on a disease which exists widely in Africa, Asia, certain of the Pacific Islands, and parts of the Americas.

7. The maritime aspects of venereal disease control have been studied by WHO from its earliest days. At its first session in 1948, the expert committee considered the view expressed by the Economic and Social Council of the United Nations that diplomatic conventions in technical fields should be replaced by health regulations adopted by the World Health Assembly. In 1949, at its third session the committee, having noted that delays are unavoidable in developing such regulations, pointed out the importance of the Brussels Agreement as the "sole practical instrument for venereal disease control between countries" (13, 17).

A particular segment of the maritime venereal disease problem has been attacked by the International Anti-Venereal Disease Commis-

sion of the Rhine. After discussion between WHO and the governments of Belgium, the Netherlands, France, Germany, and Switzerland, the Commission was established in 1951 to coordinate venereal disease services of these five nations for the benefit of the Rhine River boatmen and their families—a floating population of some 45,000 persons—and to establish diagnostic and treatment facilities in the principal ports of the river. An extension of the Commission's work is the Port Demonstration Project, established in Rotterdam to study venereal disease control among seafarers.

8. As units of a global structure, regional health organizations have been established to serve the needs of particular areas. The regional system of WHO was completed in 1951. There are today six regional offices covering Africa, the Americas, the Eastern Mediterranean, Europe, Southeast Asia, and the Western Pacific. The Regional Office of the Americas has been established in the Pan American Sanitary Bureau in Washington.

PASB and WHO Projects

Actually, the PASB has a far longer history in international health than WHO. The first health agency to function over a wide area for many governments, it antedates the Office Internationale d'Hygiène Publique by several years, having been formally organized by the Pan American Sanitary Conference in 1902. It functions today both as WHO's regional office and independently as the operating agency of the Pan American Sanitary Organization (8, 9).

A number of WHO-sponsored or -aided venereal disease control projects have been and are being conducted in the Americas. A yaws-eradication program in Haiti, for example, is being conducted under an agreement between PASB (as WHO's regional office), United Nations International Children's Emergency Fund, and the Haitian Government. Numerous South American countries have some kind of WHO-aided venereal disease control projects in progress, for example, demonstration and training projects in Ecuador and Paraguay, a training center in Venezuela, and laboratory training programs in Guatemala and Brazil.



WHO photographs

(Left) WHO public health educator calls a conference of social workers from Gabiah Province, Egypt, during a campaign against congenital syphilis. (Right) Director of Health at Sarajevo and leader of the Yugoslav-WHO-UNICEF antiepidemic syphilis campaign in Bosnia, examines boy's mouth for syphilitic lesions.

A number of other cooperative venereal disease control operations have been conducted in Mexico, Central America, and South America, through bilateral planning between the United States and other individual governments. And during World War II, the Inter-American Cooperative Health Program was initiated among the American Republics not only to provide medical and public health services for war workers but also to supplement and extend long-term disease control programs. Functioning through the Institute of Inter-American Affairs and the governments concerned, this program included VD control operations. At present, the Institute is co-operating with the Mexican Government and the Pan American Sanitary Bureau in a VD control program along the Mexico-United States border (19).

The PHS and the International Program

The Public Health Service entered the international venereal disease control picture through the League of Nations clinical studies

of syphilotherapy. Requested to participate in these studies, the Public Health Service undertook to assemble 10,000 case records from syphilis clinics in the United States, to analyze them, and to forward the records to the League for further analysis and comparison with data from other countries. Incidentally, at the time the League studies were begun, the Service decided to utilize the same sources of data in the United States for a more intensive investigation of the results of treatment of syphilis in this country. The participants in this inquiry—leading syphilis clinics—were the first members of the Cooperative Clinical Group, which developed some of the most comprehensive statistical and clinical studies of syphilis treatment on record.

The United States venereal disease control program, through its successful application of public health techniques to the venereal disease problem, has influenced the structure and content of WHO's antivenereal disease activities. In 1949, a seven-member Syphilis Study Commission of WHO toured venereal disease control

installations in this country (a) to evaluate methods in use in the United States and the importance of these methods in national and international programs, and (b) to study control methods, particularly penicillin treatment in syphilis. The Commission reported the organization and methods in the United States to be a helpful guide in planning future programs in other parts of the world, subject, of course, to adaptations to meet local conditions and problems.

Standardized laboratory procedures in the United States program and methods employed in compiling and analyzing statistical data were approved. Certain features of training and utilization of personnel were also viewed with favor, for example, special training in venereal disease control for medical officers assigned to this field, and performance by specially trained nurses, health educators, and investigators of a major part of epidemiological, educational, and technical work (20).

Undoubtedly, the experience in the United States with penicillin has hastened acceptance of this form of therapy in the international program. The WHO Syphilis Study Commission thought that the drug used in a control program is less important in diminishing the amount of venereal disease than the ready availability of treatment facilities plus an active case-finding program. Nevertheless, it recognized that the rapidity and nontoxicity of penicillin therapy makes this antibiotic of great value in syphilis control.

Results of WHO's Program

One of the most significant undertakings of WHO in treponemal disease control, in terms of permanent progress, is the training phase of the program. Personnel are being indoctrinated in essentials of public health practice which will serve both specialized treponemal disease campaigns and generalized health programs. For the private physician in contact with epidemiological and treatment demonstrations, there is opportunity to learn some of the attitudes and substance of preventive medicine—particularly important in areas where physicians receive little of these in their medical training.

Some valuable lessons in the methodology of mass attacks on disease are emerging. Clark (21) has pointed out the contribution to epidemiology made by the endemic syphilis program in Bosnia, Yugoslavia. Reynolds and Guthe (22) have summarized conclusions on case finding and treatment reached in WHO's early programs of mass penicillin therapy. These and other experiences indicate that in mass treatment programs a very high percentage of the population involved must be reached for examination if results are to be satisfactory. Experience in Haiti has given some excellent leads as to how this high level of coverage may be obtained. Where reliance is placed on voluntary clinic attendance, even when bolstered by a public appeal campaign, less than half the population will be reached. When, in addition, mobile clinics are used in strategic areas, the percentage rises to 70. Ninety-percent coverage in Haiti was achieved only when a house-to-house survey was employed.

Towering above all other results, real or potential, of international treponemal and venereal disease control is the prospect that the massive prevalence of these diseases may be cut down and possibly eradicated in large areas. Both in terms of humanitarian objectives and of economic improvement of the areas involved, this prospect has very broad ramifications indeed.

It has been pointed out that treatment alone has never eradicated a disease on a global scale; neither has vaccination nor environmental sanitation. But history abounds with instances of disease controlled by public health methods, and WHO's experience with mass treatment of venereal and treponemal disease encourages the belief that control and possibly eradication of these infections can be achieved.

This experience shows that infectiousness in treponematoses can be significantly reduced by mass use of penicillin in aluminum monostearate. In the Bosnia program, cases of secondary syphilis were found at the first control examination to be about 10 percent of the number found at the beginning of the campaign. At later examinations, this number was further reduced. While results are less spectacular in

other campaigns, significant reductions in infectious cases have occurred in programs in Haiti, Indonesia, Thailand, and Iraq. Up to January 1953, well over 9,000,000 persons had been examined and over 3,000,000 treated for treponemal disease in intensive campaigns sponsored by WHO and often substantially aided by UNICEF (22).

A single mass treatment campaign in an area is not sufficient to master permanently the venereal or treponemal disease problem in that area. Successful public health programs are usually protracted affairs. In treponemal and venereal disease, there must be a continuing effort to decrease the number of infectious cases, and resurveys are necessary to prevent recrudescence. Many factors—extent of the disease, completeness of case finding, opportunities for reintroduction—must be considered before the question of how many mass surveys can be answered for an area. Infectious cases must be brought down to the point where the local case-finding and treatment operation is adequate to deal with remaining pockets of infectious cases. Clearly, the more mature and complete the local public health organization, the earlier it can assume full responsibility for the local disease situation.

This fact helps to illuminate the wisdom of WHO's approach to venereal and treponemal disease control: to aid, to the extent of its resources, in the immediate diminution of disease in areas of greatest need, and at the same time to assist in building permanent public health structures especially through training of native personnel. This kind of attack, well supported and continuous, makes bright the hope that effective worldwide control of venereal and treponemal disease can be accomplished.

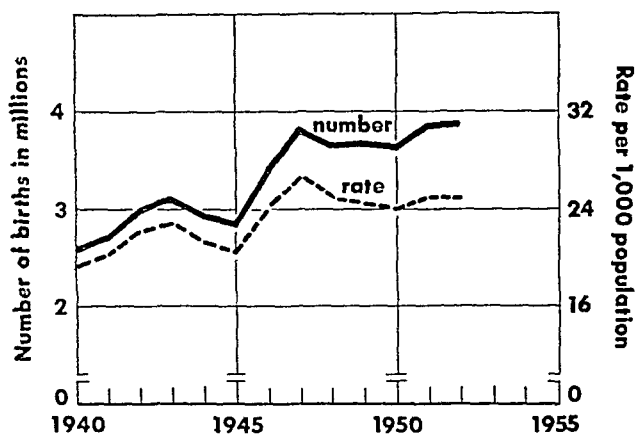
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U. S. Birth Statistics, January–April 1953

In April 1953 there were an estimated 292,000 live births. This is the first time in about a year that births were not higher than the corresponding monthly figure of the previous year. The birth rate on an annual basis for this April—22.5 per 1,000 population—was also somewhat lower than a year ago. In 1952, however, April births had been close to the all-time record for this month.

For the first 4 months of 1953, the total number of births remained high. During this period, births occurred at an annual rate of 24.4 per 1,000 population, and totaled an estimated 1,262,000. This is 23,000, or 2 percent, more than was estimated for the same period last year. These estimates allow for under-registration of births.



Estimated total live births and birth rates for the United States, 1940–50

NOTE: Data based on births adjusted for under-registration.

Since the end of World War II, more children have been born every year than in any wartime or prewar year. From an estimated 2,858,000 births in 1945 the total soared to 3,817,000 in 1947. After dropping to a slightly lower level for the next 3 years, the birth total reached a new high in 1951, and broke the rec-

ord again in 1952 with an estimated 3,889,000 live births.

Based on registered births alone, 58,000 more couples had a first child in 1951 than in 1950, according to preliminary estimates. This 5-percent increase in first-born children was largely a sequel to the marriage upswing that began in June 1950, at the start of the Korean War. Births of second-born children increased

Estimated total live births and registered live births, and birth rates in the United States, 1940–52, and January–April 1952 and 1953

[Data on total live births include estimates for unregistered births. Rates per 1,000 population]

Period	Estimated total live births		Registered live births	
	Number	Rate ¹	Number	Rate ¹
<i>Jan.–Apr.</i>				
1953 ² -----	1, 262, 000	24. 4	1, 243, 000	24. 0
1952 ² -----	1, 239, 000	24. 2	1, 218, 000	23. 8
<i>Entire year</i>				
1952 ² -----	3, 889, 000	25. 0	3, 824, 000	24. 6
1951 ² -----	3, 833, 000	25. 0	3, 758, 000	24. 5
1950-----	3, 632, 000	24. 1	3, 554, 149	23. 6
1949-----	3, 649, 000	24. 5	3, 559, 529	23. 9
1948-----	3, 637, 000	24. 9	3, 535, 068	24. 2
1947-----	3, 817, 000	26. 6	3, 699, 940	25. 8
1946-----	3, 411, 000	24. 1	3, 288, 672	23. 3
1945-----	2, 858, 000	20. 4	2, 735, 456	19. 5
1944-----	2, 939, 000	21. 2	2, 794, 800	20. 2
1943-----	3, 104, 000	22. 7	2, 934, 860	21. 5
1942-----	2, 989, 000	22. 2	2, 808, 996	20. 8
1941-----	2, 703, 000	20. 3	2, 513, 427	18. 8
1940-----	2, 559, 000	19. 4	2, 360, 399	17. 9

¹ All rates on an annual basis. For 1940 and 1950, rates based on enumerated population residing in the United States as of April 1; for 1941–46, based on estimated midyear population including Armed Forces overseas; for 1947–49, 1951, and 1952, based on estimated midyear population excluding Armed Forces overseas; for January–March 1952 and 1953 based on quarterly estimates of the population excluding Armed Forces overseas.

² Preliminary estimates.

moderately (2 percent over 1950), while increases in third and fourth births were more substantial—9 percent and 13 percent, respectively—continuing a steady rise that has been going on since the end of World War II.

Prepared by the National Office of Vital Statistics, Public Health Service.

Incidence of Reactions To Antirabies Horse Serum

By THOMAS S. HOSTY, Ph.D.,
and FRANK R. HUNTER

THE REAWAKENING of interest in the development of hyperimmune rabies serum has made available a new approach to the prevention of rabies in man. Several groups of workers are now, or have been, exploring the use of serum as an adjunct to the classic vaccination procedure or possibly even as an outright replacement of vaccination (1-3).

During a recent outbreak of rabies in Birmingham, Ala., two children died from rabies, despite prompt and intensive vaccination with 14 Semple treatments. The incubation time was 17 days in one child and 19 in the other. Such short incubation periods allow very little time for the development of immunity. The Alabama State Department of Public Health laboratory in Birmingham, therefore, made available, first, hyperimmune antirabies rabbit serum and, later, a hyperimmune antirabies horse serum concentrate, to supplement vaccination.

This report deals with the use of the horse serum concentrate, which was provided by Lederle Laboratories with the request that the incidence of serum sickness following its use be assessed. The horse serum concentrate was used only on patients having face, neck, arm, and hand bites, the patients having been skin-tested before administration of the serum. Serum was not used if the bite occurred longer than 72 hours prior to the time serum could be given. The dosage was 0.25 ml. per pound of body weight given intramuscularly, followed in 24 hours with at least a 7-course treatment of Semple vaccine unless a shorter course was indicated by the condition of the biting dog.

Dr. Hosty is director of laboratories of the Alabama Department of Public Health. Mr. Hunter is director of the department's branch laboratory in Birmingham.

Serum Reactions

Reactions to antirabies horse serum concentrate in 32 patients are presented in the table. Eight of the patients had attacks of serum sickness of varying intensity. Only three of these reactions were severe and two were moderate. The latter two reactions were on a mother and daughter. If the three slight reactions are discounted, the reaction rate is 15.6 percent, a figure which compares favorably with reported reaction rates following the use of rabbit serum and is far less than reported rates following the use of sheep serum (3). If this reaction rate is maintained with more extensive experience, the use of antirabies horse serum in the presence of a negative skin test would not be contraindicated.

Ten of the patients were bitten by dogs proved rabid. The presence or absence of virus in the submaxillary glands of the dogs, however, was not determined except for patient 32. In this instance, rabies virus was demonstrated in an LD₅₀ titer of 10⁻⁴. Four additional patients were bitten by dogs in which rabies was doubtful. In one instance the biting dog was not found, and in two instances the animals were killed and the brains found negative for Negri bodies. In the latter two cases, no animal inoculation was done. In one other instance, Negri bodies were found by one laboratory but not by another. Animal inoculation in this case, however, was negative. Of the patients bitten by dogs proved rabid, 7 had face bites; 2, finger bites; and 1, leg bites. Of those bitten by doubtful rabid animals, 2 had face bites; and 2, finger bites.

Discussion

Experimentally the use of antirabies serum has a good foundation (2, 3). One adverse report which has appeared is not based on recent experimental evidence (4). It is not possible, of course, to draw a definite conclusion as to the value of serum on the basis of this limited study. It is safe to say, however, that there are no serious contraindications to its use and that it may indeed have done some good.

In view of the fact that 7 patients with face or neck bites and 2 with finger bites from rabid

Data on 32 patients treated with hyperimmune rabies serum of horse extraction

Patient	Age (years)	Weight (pounds)	Location of bite	Nature of bite	Animal rabid	Number of days Semple vaccine given	Serum dosage (ml.)	Reaction
1-----	8	87	Face-----	Severe-----	No-----	9	20	None.
2-----	6	45	Legs-----	Mild-----	Yes-----	14	10	None.
3-----	6	46	Cheek, chin, and upper lip.	Moderate-----	Yes-----	14	10	None.
4-----	4	35	Finger-----	Mild-----	Yes-----	14	9	None.
5-----	3	28	Cheek-----	Mild-----	Yes-----	14	7	None.
6-----	4	40	Face and abdomen	Severe-----	Doubtful-----	14	10	None.
7-----	5	40	Face-----	Moderate-----	No-----	7	10	None.
8-----	4	42	Lip-----	Moderate-----	No-----	7	10	None.
9-----	6	50	Eyelid and scalp	Severe-----	No-----	0	20	None.
10-----	3	33	Lip-----	Mild-----	No-----	7	8	None.
11-----	4	37	Cheek-----	Mild-----	No-----	6	9	None.
12-----	9	50	Chin-----	Mild-----	No-----	7	12.5	None.
13-----	14	40	Forehead and scalp	Severe-----	No-----	7	10	None.
14-----	4	37	Cheek-----	Moderate-----	No-----	6	9	None.
15-----	5	39	Lips-----	Mild-----	No-----	7	9.75	None.
16-----	4	44	Forehead and eyelid	Severe-----	No-----	7	10	None.
17-----	16 (mo.)	40	Face-----	Mild-----	Yes-----	14	10	None.
18-----	4	41	Forehead-----	Mild-----	No-----	7	10	None.
19-----	6	43	Face-----	Severe-----	No-----	0	11	None.
20-----	3	30	Face-----	Moderate-----	No-----	7	10	None.
21-----	4	35	Cheek and lip	Severe-----	Yes-----	14	9	None.
22-----	3	30	Face-----	Severe-----	No-----	3	12	None.
23-----	13	80	Face-----	Severe-----	No-----	2	32	None.
24-----	8	60	Face-----	Severe-----	No-----	2	15	None.
25-----	28	160	Neck-----	Mild-----	Yes-----	14	40	Mild. ¹
26-----	8	60	Thumb-----	Moderate-----	Yes-----	14	15	Mild. ²
27-----	4	32	Lip-----	Mild-----	No-----	7	8	Mild. ³
28-----	31	128	Fingers-----	Moderate-----	Doubtful-----	14	32	Moderate. ⁴
29-----	8 (mo.)	20	Face-----	Mild-----	Doubtful-----	14	5	Moderate. ⁵
30-----	2	31	Forehead, eyelid, and leg.	Moderate-----	Yes-----	14	8	Severe. ⁶
31-----	26	134	Two fingers-----	Mild-----	Doubtful-----	14	33	Severe. ⁷
32 ⁸ -----	6	40	Nose-----	Mild-----	Yes-----	14	10	Severe. ⁹

¹ Slight urticaria 10 days later.² Slight rash at site of injection 11 days later.³ Slight redness and itching around injection area 8 days after, lasting 2 days.⁴ Rash 4 hours after injection. Rash reappeared after 5 days, lasting 5 days.⁵ Urticarial rash 5 days after injection, lasting 5 days.⁶ Fever, nausea, and vomiting fifth through ninth day.⁷ Severe urticarial reaction with swelling, fever, pain, nausea. Cleared in 11 days.⁸ Virus isolated from submaxillary gland of dog, LD₅₀ titer of 10⁻⁴.⁹ Rash and swelling after third day. Cleared in 5 days.

dogs were treated with a low potency vaccine, as measured by the Habel test, and that Sellers (5) has shown that the risk of infection is 72 times greater in face bites than in leg bites and 5 times greater in hand bites than in leg bites, it may be assumed that these patients were at great risk. Certainly patient 32 was exposed to infection because of the large amount of virus present in the submaxillary gland. None of the patients have to date developed rabies.

At present, it is premature to rely on serum treatment alone. If its use, however, permits a reduction in the number of vaccine treatments

from the usual 14 to perhaps 7 or less, this would in itself be a distinct advantage, since a shorter course of vaccine treatment should reduce the risk of postvaccination paralysis. Serum is also advantageous in cases in which the biting dog cannot be found immediately. Its use would allow time for a thorough search for the dog before vaccine treatment is initiated. When vaccine treatment is indicated only on the theory that any animal bite, no matter how trivial, can produce rabies, judicious use of serum might permit elimination of vaccination and at the same time offer the patient mental

relief. Finally, in the presence of severe face and hand bites, simultaneous use of serum and vaccine should materially reduce the danger of infection, if, in fact, the serum alone were not efficacious. The prolonging of the incubation period through the use of serum gives more time for active immunity to develop from the vaccine.

Conclusion

Further experience is needed to determine the value of antirabies serum. At present, however, it should be considered as another worthwhile tool in the prevention of rabies and should be used wherever indicated.

ACKNOWLEDGMENT

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Municipal Sewage Treatment Plant Construction

A total of 515 communities in the United States were awarded contracts in 1952 involving an expenditure of \$137 million for construction of municipal sewage treatment plants, according to a recent report released in May by the Public Health Service. Of these contracts, 314 were for new plants costing \$78,419,556; and 201, costing \$58,789,133, were for additions, enlargements, or replacements of existing plants.

The report compares the 1952 rate for this type of construction with the annual rate of from \$450 million to \$500 million estimated to be required over a 10-year period to bring the pollution caused by municipal wastes under reasonable control. The 1952 total of \$137 million is less than that for any year since 1948. It also falls short of the long-term average of \$141 million for the period 1915-50.

The report is available in the Division of Water Pollution Control, Bureau of State Services, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C.

During the first quarter of 1953, \$31 million was invested by 119 municipalities for sewage treatment projects. Of these, 61 contracts were for construction of new sewage treatment plants; 48 were for enlargement or improvement of existing plants, and 10 were for construction of interceptor sewers.

OCCUPATIONAL HEALTH

Radiation Exposures

In the July (and final issue) of *Occupational Health*, Duncan A. Holaday summarizes the potential health problem from exposure to radiation. For many of the biological effects of radiation, there is a threshold dose below which no permanent damage will occur, he writes. For certain effects, such as the production of mutations, shortening of the life span, and possibly carcinogenesis, there is no lower threshold.

"Animal experiments and such data as we have on humans indicate that moderate radiation doses will increase the normal radiation rate," Mr. Holaday points out. For this particular effect, all radiation exposures are additive. "Calculations of radiation doses from various sources, such as the industrial and medical use of radiation, indicate that it is possible for an average person to be exposed to biologically significant amounts of radiation."

Mr. Holaday, an engineer with the Occupational Health Field Station of the Public Health Service at Salt Lake City, advises "all health departments to obtain data on the location of sources of radiation in their areas, on the levels of radioactivity in air and water, and on control and protective measures employed." Such baseline information, he concludes, would permit an intelligent appraisal of the extent of the present and future problems which the use of radiation may create and would permit the responsible agencies to determine their future course of action.

Other items in the July issue include articles on:

"Occurrence of Radon in Non-Uranium Mines in Colorado" (by P. W. Jacoe). The finding of appreciable quantities of radon in mines located several hundred miles from the nearest known deposit of uranium-bearing ore might indicate the possibility of undiscovered ore bodies nearby.

"Industrial Medicine Services in Italy" (by R. Vigliani). The number of industries in Italy which have their own medical services is increasing, although there is as yet no law compelling every industry to organize a medical service in its factories or establishing the rights, duties, or professional training of factory physicians.

"Occupational Health—A Joint Industry and Public Health Responsibility" (by Charles D. Yaffe). Industry in recent years has come more than halfway to meet the health agency in shouldering the responsibility for occupational health work.

"Occupation and Health" (by Seward E. Miller). Health hazards are reviewed in selected industries, such as chromate-producing, and in certain occupations, such as arc-welding in the steel shipbuilding industry.

Suspension Notice

Publication of *Occupational Health*, a monthly since 1940, has been suspended with its July 1953 issue as the result of reduction in appropriations. However, *Public Health Reports*—which in recent issues has presented papers on air pollution, human relations in industry, occupational and environmental aspects of various diseases, and industrial dentistry—will give increased attention to technical topics in occupational health. Official agencies, professional organizations, and teaching institutions not now receiving *Public Health Reports* should inquire of the Public Health Service as to their eligibility for official or free subscriptions. Other groups—and individuals wishing personal copies—should purchase subscriptions. *Use the subscription blank on the inside back cover of this issue.*

Recent issues of *Occupational Health* are available at 10¢ a copy from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Elements of a Coordinated System Of Vital Records and Statistics

By HALBERT L. DUNN, M.D., Ph.D.

THE TEEN-AGER who needs a birth certificate to prove he is old enough to work and the demographer who needs global data to forecast world population are both served by the vital statistics system. Whether they are served well or badly depends on the functioning of a multitude of complex mechanisms—the local, State, Federal, and international units that make up the vital statistics system. These units collect and preserve vital records, perform essential services to the public in relation to the records, and produce the tabulated data that form the body of vital statistics.

Problems of Coordination

The most important problem facing the diverse mechanisms that make up a system of vital statistics is how to function as a coordinated whole. The individual units in the system may be likened to pieces of a mosaic. How can they be fitted together to form a complete picture, without blank spaces and overlapping? How can the methods and procedures of these

diverse units intermesh to produce a smooth-working, coordinated system?

“Coordination” is a much-abused word that should be defined at the outset. In this paper it does not mean the kind of coordination that implies a coordinator. The units that make up the vital statistics system are autonomous and will no doubt remain so. Any coordination that applies to these units must be the kind that develops through voluntary agreement on objectives, approaches, procedures, and the share of the total job that is appropriate to each.

The kind of coordination considered here is independent of organizational structure. It does not come by decree from above, and is not necessarily advanced by concentrating power in a centralized authority. For even though all record-collecting and statistical agencies might conceivably be centralized under a unified command, there would still have to be faced the original problem of coordination—of meshing the goals and procedures of statistics producers with those of statistics consumers, of relating the far-flung operations to the specialized needs of people outside the system for data on specific subject matter.

Agreement on Objectives

The problems of developing a coordinated system of vital records and statistics, therefore, should be approached primarily in terms of getting voluntary agreement by all the component units. What are the common objectives? Does each unit visualize the vital statistics system as a whole, not just as a miscellaneous mixture of little parts? In terms of the system as

Dr. Dunn is chief of the National Office of Vital Statistics, Public Health Service, and has been in charge of this unit, which was originally in the Bureau of the Census, since 1935. For the 12 years ended June 1952 he was secretary-general of the Inter American Statistical Institute and is now consultant to its executive committee. This paper was presented before the annual meeting of the American Statistical Association at Chicago, Ill., on December 27, 1952.

a whole, does each unit know where its own job begins and where that of the others leaves off? Are the right organizational pieces in the right places? In sharing the total job, have gaps been left?

Coordination is not a single problem. To obtain a fully complementary system of vital records and vital statistics, at least four distinct problems must be solved.

First, there is the matter of developing a proper working relationship among the various agencies producing vital records and vital statistics at each level of government—local, State, national, and international. We might call this intralevel or horizontal coordination. Much concern has been expressed, for example, about State and Federal governments in which various units allegedly publish noncomparable, unnecessary, or overlapping data that fail to meet much of the data needs of consumers. Criticism of this type in other fields of statistics led to the creation of the division of statistical standards in the U. S. Bureau of the Budget and to various other recommendations by commissions and other investigating bodies.

The second problem is to coordinate the objectives and practices of the local, State, national, and international vital statistics agencies. This interlevel coordination is of particular importance since vital statistics are produced in a vertical, step-up process, in which records or data move straight up from the smallest geographic divisions to the largest. For example, good vital statistics at the State level depend on records produced in local subdivisions; good national vital statistics depend on comparable material from 57 independent registration areas, and so on. Because of the massive vital record problem in this country, much work and effort have been directed toward vertical coordination, and considerable progress has been made in developing uniform standards, definitions, certificate forms, tabulations, and other procedures.

Orientation to Subject

The third problem is orientation of vital statistics to the broad variety of subject matter which they help to illuminate. Intersubject coordination is concerned with the use of vital statistics in relation to other data on the social, health, economic, geographic, and other char-

acteristics of populations. Special studies would give the answers to most of the problems in this area, and certainly the vital statistics system, operating at all levels of government, has the potential resources to conduct studies along many fronts. What studies are most needed? Which particular office is in the best position to carry it out? How can the study be so planned and conducted that its results will be applicable not only to the office that made it but to all other offices and agencies with similar problems? Certain types of studies are more appropriately made at the national level. A conspicuous example is a national health survey, machinery for which might be developed as a means of obtaining morbidity data from the general population to serve a variety of health needs. The skills incorporated in such a mechanism could be made available, upon request, to State agencies and nonofficial health organizations.

The fourth problem has to do with the coordination of various data that relate to the same individual, regardless of where these records were originally created and placed on file, so that the major events in his life may be linked and related to one another. Of necessity, such records are filed, if at all, where the event occurred, so that if he moves around much, his records may be scattered all over the United States and even in foreign countries. One office has his birth certificate, another his marriage license, while still others have his military, social security, and work records. His clinical records are scattered among the files of all the hospitals and physicians that have ever treated him. To pull copies of these records together, for the individual's own use, or for health control purposes, or for longitudinal studies, has become extremely difficult. Because of the political implications of attaching an identity number to the individual, and because of the substantial technical problems involved as well as differences of opinion as to the utility of such records, little is being done along this line.

Basic Terms Defined

It might be well to define our basic terms before discussing the elements that make for coordination:

"A coordinated system of vital records and

statistics" involves agencies at all levels of government that are responsible for the registration, collection, processing, and interrelation of vital records and the production of vital statistics derived from them. It includes mechanisms for improving methodology, for promoting internal consistency, efficiency, and economy, and for broadening the usefulness of vital records and statistics.

"Vital records" are certificates of death, fetal death, birth, legitimation, legal change of name, marriage, annulment of marriage, divorce, immigration, and naturalization.

"Vital statistics" are the statistical by-products of vital records.

"Related statistics" include population and morbidity statistics.

Immigration and naturalization records are included in the definition of vital records because they are recorded in much the same way and are used for similar purposes, even though historically they have not been handled by the same branch of government that handles other vital records.

Many other public records on individuals are officially collected and maintained—such as those of military service, social security, and professional licensing. As circumstances warrant, these might be considered for possible coordination with vital records.

It will be noted that morbidity statistics are classed as related statistics rather than as vital statistics. By historical accident both morbidity and vital statistics are often produced by the same government agencies, but their fundamental nature is quite different. Morbidity statistics are, of course, closely linked to vital statistics by a common classification for sickness and cause of death. But the legal and personal uses of morbidity records are extremely limited—most people, in fact, never see their own sickness records. Even though morbidity statistics may be part of the workload of a vital statistics agency, they are not an intrinsic part of the vital statistics system.

Elements of a Coordinated System

The importance of vertical coordination has already been mentioned, and the accompanying table is a first attempt toward mapping a distribution of the responsibilities of the several levels

of government with respect to vital statistics. In presenting my personal viewpoint as to where the primary responsibilities lie, it is not my intention to suggest a limitation of activity or functions of any of the units. Certainly there is room for constructive thinking on each of the elements at all levels of government.

Each person operating in a vital statistics office—whether at the local, State, national, or international level—tends to think of his own particular problems as discrete in nature, and his own office as a sovereign body. The time has come, however, when it is necessary for all those who hold responsible positions in units of the system to reexamine what they are doing with reference to the system as a whole in terms of the impact on the users of the records and of the resultant statistics. Perhaps the great advances of the future will come largely from a better concept of the system as a whole and a realization of the true functions, responsibilities, and potentialities of its parts.

In a dynamic field like vital records and vital statistics, which must continue to change in response to the needs of an ever-changing world, it will never be practical to set final goals. The 10 elements described below and summarized in the table are not to be regarded as final goals. They are proposed rather as basic components of the "next stage" in developing a coordinated system of vital records and vital statistics.

Completeness, Accuracy, Timeliness

The first element is completeness, accuracy, and timeliness in the registration of vital events. Behind these words is a never-ending struggle to obtain and secure the active cooperation of several hundred thousand official and semipublic personages who fill out certificates—physicians, hospital personnel, midwives, coroners, funeral directors, and others. To get in this country a reliable statement of the cause of death, for example, requires the understanding and cooperation of some 210,000 practicing physicians, who need instruction and reinstruction with every revision of the International Classification of Diseases, Injuries, and Causes of Death. To achieve satisfactory birth registration in two-thirds of the States has taken a full half-century of patient effort with physicians and

Elements of a Coordinated System of Vital Records and Statistics

ELEMENTS	Local responsibility	State responsibility ¹
1. Completeness, accuracy, and timeliness of vital records (except immigration and naturalization).	Primary responsibility for accurate and timely collection.	Primary responsibility for developing and maintaining State and local procedures in collection, and for consultation.
2. Preservation and protection of vital records, and service to the public.	Participation with State vital statistics office.	Primary responsibility for methods used, results obtained, and services rendered.
3. Focus of coordination: Definitions, classifications, laws, certificate forms, interstate and international procedures, and consistency control of vital statistics.	Participation with State vital statistics office and application of approved methodology.	Participation with NOVS in development of standards; primary responsibility for the application of methods and for consistency within the State.
4. Training and education of personnel.	Training programs for local purposes.	Inservice training of State and local personnel; participation in national training programs and academic training.
5. Vital records of American citizens abroad and of naturalized citizens at home and abroad.	Collaboration with State programs.	Collaboration with national agencies; and representation of local use requirements in national programs.
6. Annual and cyclic vital statistics (including life tables).	Production of local statistics; collaboration with State programs.	Primary responsibility for production of State and local vital statistics, including methodological research.
7. Special studies via vital and social statistics.	Local studies.	Planning and execution of State and local studies.
8. Population statistics and population estimates.	Participation with State on methods of research and collection of data.	Participation with Bureau of the Census and NOVS on methods research and collection of data.
9. Morbidity statistics, including morbidity reporting and health surveys.	Administrative responsibility for local morbidity reporting and local health surveys.	Primary responsibility for morbidity reporting and health surveys. Participation with Public Health Service on methods of research and development of standards and procedures.
10. A national vital statistics index (when and if established by law).	Participation with State vital statistics office.	Participation with Federal agency in developing standards and methods for establishing, and primary responsibility for implementing State portions.

¹ Includes Territories and independent registration cities (New York City; Boston; Washington, D. C.; Baltimore; and New Orleans).

midwives, as well as continuous education of the general public. The battle in the remaining States should be won within the next decade.

The drive toward complete and accurate registration was given a decisive impetus early in World War II, when defense plants and public agencies of all kinds insisted on proof of citizenship and other pertinent facts. As a re-

sult, State and local offices were swamped with demands to produce certified copies of records. This led to two permanent gains—a new public awareness of the value of complete and accurate registration, and more efficient procedures in State and local offices to cope with the increased public dependency on vital records.

Registration is primarily a local responsi-

and the Locus of Responsibilities for These Elements

National responsibility	International responsibility	ELEMENTS
Conduct of special studies aimed at improving methods, consultation service on request.	Establishment of general principles to meet international needs.	1. Completeness, accuracy and timeliness of vital records (except immigration and naturalization).
Conduct of methods research, maintenance of exchange of information, and consultation.	Establishment of general principles to meet international needs.	2. Preservation and protection of vital records, and service to the public.
In collaboration with States, primary responsibility for standards and practices.	Primary responsibility for international coordination of practices.	3. Focus of coordination: Definitions, classifications, laws, certificate forms, interstate and international procedures and consistency control of vital statistics.
Establishment of training programs and centers, participation in international programs and collaboration with schools of public health.	Establishment of training programs and related activities.	4. Training and education of personnel.
Establishment of a Federal focus for vital records involving, among others, the Immigration and Naturalization Service, State Department, and NOVS.	Responsibility for the coordination of vital record practices between nations.	5. Vital records of American citizens abroad and of naturalized citizens at home and abroad.
Primary responsibility for production of national vital statistics, including methodological research.	International statistical publications and exchange of information on statistical methods between nations.	6. Annual and cyclic vital statistics (including life tables).
Responsibility for developing special studies of national significance and collaboration with States.	Responsibility for special studies of international significance.	7. Special studies via vital and social statistics.
Production of population data a primary responsibility of Bureau of the Census. Small area estimates should be produced in collaboration with NOVS and States.	Promotion of national censuses having the degree of consistency essential for international needs.	8. Population statistics and population estimates.
Primary responsibility for national public health surveys and national morbidity reporting standards, in collaboration with State health departments.	Promotion and implementation of a worldwide morbidity reporting mechanism and promotion of national health survey mechanisms.	9. Morbidity statistics, including morbidity reporting and health surveys.
Primary responsibility for developing standards and methods to be used, and maintenance of consistency control in its operation.	Responsibility for developing and promoting standards and methods to be used consistent with international needs.	10. A national vital statistics index (when and if established by law).

bility. A late State registrar put this point most aptly: "The local registrar knows the new baby of the Jones family as Johnny Jones; the State registrar knows him as a certificate and a number; and the National Office [of Vital Statistics] knows him as a statistic." Only at the local level do vital records reflect real people, living in real places. If the record is to be complete, the local registrar must be on the job. If

hospital, physician, funeral director, or midwife fails to fulfill responsibilities, it is the local registrar who, with tolerance and patience, must explain, persuade, and follow up until the person mends his ways.

This is a difficult and important task, carried out by part-time workers usually paid on a "per certificate" basis. It takes understanding on the part of the local registrar, and considerable

devotion to a cause. This does not come of its own accord. To develop such a group of local registrars is a prime responsibility of the State vital statistics office. It means carefully prepared manuals of instruction for the local registrar. It means field visits by the staff of the State office and consultation between them and the local registrar. It means occasional conferences of local registrars and formalized periods of instruction. But most of all, it means the creation of an awareness of the importance of the task. Everyone does a job better when he knows why it is important and how it fits into a larger pattern of services.

Preservation and Protection of Records

Preservation and protection of vital records and service to the public have long been a major responsibility of the State registrar. Huge concrete and steel vaults are located in almost every State to house the precious documents and to protect them from fire and flood. Toughness of paper, durability of ink, and protection against mildew and mold are matters of constant concern.

Protection of records also involves safeguarding them against alteration or theft. In the old days when practices were looser, it was not unknown for a person who was permitted to search the bound volumes of certificates to rip out and carry away one of these important documents. Imagine the temptation it would be to a souvenir collector if the birth certificate of one of our American Presidents were under his itching fingers, with no one watching!

Unwarranted disclosure of facts on certificates might embarrass or damage individuals. The registrar must therefore restrict access to records to persons who can demonstrate "a direct, tangible, and legitimate interest" in the specific record. At the same time he must minimize red tape in providing certifications to those who do have such an interest. It may be assumed that everyone wants ready access to his own record or to a certified copy, so that he may present it to the various public and private agencies that require it as a condition of employment, old age pensions, and other benefits. At the same time he may want the record withheld from individuals or agencies such as the press,

the courts, and law enforcement agencies. The framing of laws and regulations that will protect the confidentiality of the record and at the same time keep it accessible to those with a legitimate interest in it is one of the knottiest problems in the registration field. Whether a common ground can be found on which the many conflicting interests can meet is now being explored by the American Association of Registration Executives, the organization of State registrars.

Focus of Coordination

The third essential element is a focus of coordination, including definitions, classifications, model laws, certificate forms, interstate and international procedures, and control of consistency of national vital statistics.

The coordination of vital records and the maintenance of satisfactory consistency in the national vital statistics are responsibilities which must be focalized in a single national agency having the authority and means to implement them. Prior to 1946 the national focus was the Bureau of the Census, which served mostly as a statistical focus. In that year, when the Congress transferred the national vital statistics activity to the Public Health Service—in line with the fact that State and local jurisdiction of vital statistics resides in health agencies—the policy was made clear that the Federal agency should also serve as a focal point in resolving difficulties and inconsistencies in registration practices.

After years of trial and error, the National Office of Vital Statistics came to the realization that the way to serve as a focus of coordination is to engage in cooperative agreements resulting from joint planning. The answer to the need for a national focus of coordination has emerged through the development of the Public Health Conference on Records and Statistics. The conference is a permanent organization, recognized by the Association of State and Territorial Health Officers as a body competent to deal with problems in the field of vital and health statistics. It is supported jointly by the States and the Federal Government, with a secretariat furnished by the National Office of Vital Statistics. Its decisions are its own and are entered into by

agreement, after opportunity for free discussion has made joint planning a reality.

In large measure the promotion of agreement on procedures and related matters is the responsibility of the national focal point of coordination. But it is interesting to realize that a similar mechanism for coordination on a world-wide scale is now emerging through the action of the World Health Organization, which has urged all nations to set up national committees on vital and health statistics. The establishment of such committees in many nations of the world, with the aim of bringing about direct participation by national technicians in the technical problems of an international nature, has launched yet another mechanism to promote better coordination. The first international conference of national committees on vital and health statistics has been scheduled for the fall of 1953.

All these recent developments lay heavy emphasis on participation and consent of all parties concerned, for the coordinating responsibility should not be exercised arbitrarily or unnecessarily. In essence, this means that each higher level of responsibility and authority should justify the need for introducing uniformity into a particular procedure before this right is surrendered by the technicians who operate closer to the people concerned. Unless this precaution is observed, the system as a whole will lose its flexibility and adaptability. Complete uniformity in all vital record and vital statistics activities is neither necessary nor desirable. Custom-tailoring in basic patterns, with flexibility to adapt the procedures community by community to fit special circumstances, is often the only way to meet registration problems.

At the same time the National Office of Vital Statistics cannot relinquish authority for control over the consistency of national vital statistics. Vital statistics of a country have little value unless they are internally consistent. In production of national vital statistics by the use of the statistics produced by State offices, the requirement of consistency becomes all-important. Agreements are not enough. Consistency in practices is so vital that the degree of consistency must be checked adequately and

continually, and alternative procedures must be available for use if consistency is not maintained.

Training and Educating Personnel

The fourth element of a coordinated system is to provide means of training and educating personnel. Vital statistics offices at all levels are handicapped by a severe shortage of personnel with sufficient academic and practical training in the techniques of vital registration and vital statistics. Training is a matter of deep concern to all levels of government. It is carried out through in-service training programs when these are practicable, through formal courses in public health schools, and through organized seminars designed to teach practical skills. The Point IV program at the international level is an effort directed at developing knowledge and skills through grants-in-aid, training centers, consultation, and other means.

Citizens Abroad and Naturalized Citizens

Vital records of American citizens abroad and of naturalized citizens at home and abroad should become an integral part of a coordinated system of vital records and statistics, if it is to be effective as a whole. A conservative estimate of the number of American citizens outside the United States during 1952 would be over 1,500,000. While abroad, many of them marry, have children, obtain divorces, or die. Records of these events are made and filed according to a multitude of foreign laws and practices; certain other records may be made—by various Federal and State agencies—when the citizen or his family comes back. But there is no single national focal point of coordination, no single custodian of such records. Considerable confusion and hardship result, for example, when a family returns from a tour of duty overseas and attempts to settle down in an American community. Are the children citizens? Are they of school age? If the parents have no records to prove such facts, where can they get them? Similar problems plague naturalized citizens, and families that have adopted children born overseas. Undoubtedly, Federal legislation will be required to straighten out this problem. While details remain to be worked

out, those who have studied the matter are in general agreement that coordinating and custodial responsibility must be vested in a single Federal agency.

Annual and Cyclic Records

Means for coordinating the planning and production of annual and cyclic vital statistics are a sixth essential element of a coordinated system. Most of the cyclic production is on an annual basis, but for many series the cycle may be shorter—for example, the “disease year” for polio and other diseases—or longer, as for the variety of series based on the decennial census. The objective is not only to produce these series at maximum efficiency but to shape the output of facts so as to enrich their significance and value to society. While the National Office of Vital Statistics has primary responsibility for this type of coordination, it must work closely with State and international agencies, including consuming agencies as well as producers.

Special Studies

Means for coordinating the planning and parceling out of vital statistics special studies are a seventh element of a coordinated system. In its historical development, vital statistics organizations have emphasized massive, overall statistics—based on all birth certificates or all death certificates, and so on. A way must be found to obtain greater balance and variety by replacing this approach, wherever practical, with sampling statistics and special studies. Instead of including every item on all certificates, desired supplementary items might be added in only one or two States, or for short periods of time. Through these and other types of studies on limited groups, a broad variety of sample data could be assembled from which to interpret the massive data. Studies undertaken in one area should be designed so that results will be applicable in many other areas. By a planned distribution of the work among statistics agencies at all levels of government, the significance of the total output could be greatly increased.

Population Estimates for Small Areas

An eighth essential element is the provision of population statistics and population esti-

mates for small areas. Adequate population data for computation of vital statistics rates are indispensable to the vital statistics field. The production of national population census data and estimates is a responsibility of the Census Bureau. Since the greatest use of both health statistics and vital statistics is made at the local level, population estimates must also be made available for small areas as well as for the country as a whole and for the States. The lack of adequate estimates of population for small areas has recently brought about an active and aggressive movement of State registrars and public health statisticians to promote a mid-decennial population count in 1955, but the prospects of achievement appear dubious.

Resources should be found to approach the problem of developing new procedures for estimating the population of small areas. This would seem to require a cooperative program on the part of the States, the Bureau of the Census, and the National Office of Vital Statistics to explore the potentialities of school census material and every other available source of relevant data.

Morbidity Statistics

Morbidity statistics, including morbidity reporting and health surveys, are closely related to vital statistics, though not an integral part. As mentioned earlier, they are linked to vital statistics through a common classification for sickness and cause of death. In addition, both morbidity and mortality data are needed for case-fatality rates.

Sampling studies and health surveys are also closely related to vital statistics. It is necessary for both sickness statistics and those of birth, death, marriage, and divorce to relate such events to the way people live. In the future, vital statistics must be concerned to an increasing degree with sampling studies designed to broaden interpretation of the data. In particular, study should be made of the population type of survey mechanism, which offers a means of filling the gaps in our knowledge and, at the same time, holds forth the possibility of broadening the interpretation and usefulness of existing reservoirs of clinical, hospital, and health data.

Cross-Indexes

In the long run, a coordinated system of vital records and statistics might well take advantage of the values inherent in cross-indexing the conglomeration of vital records that are created for each individual throughout his lifetime. Such an index, operating on a national scale, may ultimately be needed not only to serve the record needs of our mobile population, but also to facilitate the longitudinal and followup studies required for medical research and public health. Fear has been expressed by some persons that such an index might serve repressive purposes, but many others feel that the strength of our democratic institutions gives sufficient security to the individual. To bring a national index into being would require, of course, a Federal enabling act, a national focal point, and a series of complementary State laws and regulations.

Conclusion

These then are some of the elements which deserve consideration in the formulation of a coordinated system of vital records and statis-

tics. But whatever the number of elements, however defined and located, there is no solution to the complex and enormous problems posed to the producers and users of vital records unless considerable uniformity can be introduced into the methods, forms, and definitions used by localities, States, nations, and the international agencies. Great strides have been made in development of a focal point which would work consistently for the coordination of vital records throughout this country.

In the immediate future lies a much more intensive campaign to improve the coordination of vital statistics through the extensive development of special studies and health surveys aimed at broadening the interpretation and significance of vital statistics in relation to other types of social and health information.

Perhaps most important of all is to stimulate the creation of a concept of a coordinated system of vital records and vital statistics. The concept of such a system must be developed as a whole, and it must be a concept to which all involved can wholeheartedly subscribe and which—primarily—will satisfy the needs of its millions of users.

Assistants to the Secretary Appointed

Georgia France McCoy of Oklahoma City, Okla., has been appointed assistant to the Secretary of the Department of Health, Education, and Welfare.

Since 1949, Mrs. McCoy has held administrative and research positions in the department of physical medicine and rehabilitation at the New York University-Bellvue Medical Center in New York City. Recently she was executive administrator of a gerontological service at the medical center.

Mrs. McCoy has had many years of public service in administering social work activities.

Donald M. Counihan has been appointed assistant to the Secretary of the Department of Health, Education, and Welfare. He will serve as legislative liaison officer.

Mr. Counihan received his law degree from Marquette University in 1946 and engaged in private practice in Milwaukee prior to serving as administrative assistant to U. S. Representative Charles W. Kersten of Wisconsin in 1947 and 1948. In private practice in Washington, D. C., before his recent appointment, Mr. Counihan is a member of the American, Wisconsin, Milwaukee, and District of Columbia Bar Associations.

Investigation of Jute Imports As Potential Plague Source

By EDGAR W. NORRIS, M.D., LEWIS B. SCHNEIDER,
LELAND J. HANCHETT, M.D., CHARLES E. KOHLER,
and WILLIAM F. BUREN

SEVERAL plague outbreaks along the west coast of South America over the past 20 years have been traced to infected fleas found in shipments of jute bags from India (1,2). It has been demonstrated also that infected *Xenopsylla cheopis* fleas can survive and transmit their infection after being trapped in bags for 30 days or more under optimum conditions of temperature and humidity (3). Since the United States imports from India approximately 350,000 tons of jute products annually, the possibility of plague introduction through this medium seemed to warrant investigation.

Between August 1949 and March 1951 the quarantine stations at San Francisco, Calif., and San Juan, P. R., conducted systematic examinations of all jute imports to determine whether or not evidence could be found of flea infestation. At San Francisco studies were conducted also to determine the survival rate and the longevity of *X. cheopis* under conditions as they prevail in the baling and shipping of jute products.

Methods Employed

At San Francisco shipments of jute from India consist principally of bolts of hessian cloth in large bales and arrive at weekly or bi-weekly intervals. Through the cooperation of

Dr. Norris is medical officer in charge, and Mr. Schneider is quarantine inspector, of the San Francisco Quarantine Station. Dr. Hanchett is medical officer in charge of the San Juan Quarantine Station, and Mr. Kohler and Mr. Buren are sanitarians assigned to the Communicable Disease Center activities in San Juan, P. R.

the importers random bales were selected. The wrappers were removed and random bolts of the jute cloth were taken out for examination. The wrappers and the jute cloth were unraveled, shaken, and brushed over a white bed sheet. These brushings were assiduously searched with high-power magnifying glasses for insects or parts thereof, and the inspectors were constantly alert to detect any insect movement. To test the keenness of the inspectors' perception, on several occasions known numbers of dead fleas were scattered about in the jute debris which had been searched previously with negative results. Upon reexamination of this debris the inspectors recovered all of the fleas which had been deposited.

Three hundred and seventy-six examinations were made of wrappers and samples of jute cloth aggregating 152,000 yards taken from 880 random bolts removed from 179 random bales. Any insects or particles suspected of being parts of insects were collected and delivered for identification to F. M. Prince, entomologist, at the Western Branch Communicable Disease Center Laboratory. No fleas, alive or dead, were found nor were any parts of fleas identified by microscopic examination.

At San Juan the jute imports consist principally of manufactured bags or gunny sacks. The examinations there included a microscopic search for fleas in all of the material shaken and brushed from the bags. The brushings were thinly spread over white paper which had been coated with a film of castor oil and tacked to light plywood for ease of handling. The low-power objective of a wide-field microscope was employed, using a very bright focusing light to illuminate the field. The examinations and identifications were made by an entomologist. The wrappers of 67 bales and a total of 4,994 bags were examined. One hundred and eighteen insects were found, of which 89 were alive, but all were identified as being of genera and species indigenous to Puerto Rico; none of these insects were fleas.

Observations on Vitality of *X. Cheopis*

In the study of the longevity and survival rate of *X. cheopis* under actual conditions of

processing and overseas shipment, conducted by the San Francisco station, the fleas were furnished by the Western CDC Laboratory. On September 15, 1949, 30 live, well-fed, noninfected *X. cheopis* were placed in each of two 9- by 14-inch cotton bags, which then were securely closed. One bag was placed between layers of jute about midway in a bale, and the second was placed under the first layer of jute. The bale was then wrapped, pressed in an electrically powered baler, sewed, and bound with flat metal strips. It was loaded in a cargo hold of a vessel of the Pacific Far East Line bound for Manila, Hong Kong, and Okinawa, and return. When this vessel returned to San Francisco 49 days later, November 3, 1949, the bags of fleas were removed and examined at the laboratory. From one bag 29 fleas were recovered and from the other, 28 fleas; all were dead. The 3 missing fleas were presumed to have escaped before the bags were tied prior to shipment.

On November 10, 1949, 150 live, well-fed, noninfected fleas were placed in a small cotton bag containing a small amount of wood shavings. The bag was secured, placed in a cardboard container and encased in a wooden box. This was placed in the hold of a vessel of the Matson Navigation Company bound for the Hawaiian Islands. Upon return of the vessel to San Francisco on December 3, after a voyage of 23 days, the box was removed and 146 fleas were recovered; all were dead. Four of the original 150 fleas were unaccounted for. Upon microscopic examination, the bodies of the recovered fleas did not appear to be undernourished, and it is believed that death was not due to starvation.

On December 15, 1949, 100 well-fed, noninfected fleas were put in a wooden box in which two freshly cut apples were placed to supply moisture. This box was shipped on a round trip to the Hawaiian Islands in the hold of a vessel, and 22 days later, upon return to San Francisco, 100 fleas were recovered from the box; all were dead.

Effect of Extreme Pressure on *X. Cheopis*

Tests were performed also at San Francisco, through the cooperation of the Western CDC

Laboratory and one of the importers, to determine how much the pressure of the baling process may contribute toward the mortality of the fleas trapped inside the bales. Three cotton bags each containing 25 *X. cheopis* were placed at different levels inside a bale of jute wrappers which was then compressed under a pressure of about 8,000 pounds—less than the pressure normally employed in the commercial baling of hessian cloth. That experiment was performed on two occasions, November 15 and December 15, 1949, with practically the same results. At the end of 10 minutes following the application of the pressure by the electrically powered mechanical baler, approximately 33 percent of the fleas were found dead; at the end of 1 hour 50 percent were dead and at the end of 72 hours more than 75 percent were dead. These observations seem to indicate that the pressure exerted in the baling process is an important factor in reducing the chances of survival of fleas trapped within bales of jute products.

Conclusions

The variations of temperature and humidity in surface vessels, incident to changing latitudes and passage through various ocean currents, are inimical to the rat flea in the absence of its natural host. Its survival is further jeopardized when trapped in jute and subjected to the pressure exerted in the baling process. If well-nourished, noninfected fleas have little chance of survival under these conditions, plague-infected fleas should be expected to have even less chance because of the additional hazard of the bacterial process causing obstruction of the stomach. Due to this blockage, the average length of life of *X. cheopis*, after being infected with plague, is only 14.5 days under relatively favorable conditions (4).

Past experience with the tremendous annual importations of jute cloth and bags and the observations presented in this report seem to validate the statement made by the Public Health Service in 1937, that "While it may not be without the realm of possibility that, under favorable meteorological conditions, fleas with-

out a host can serve as reservoirs of plague infection, carry it over long distances and later, under favorable conditions, transmit the disease, such danger is probably insignificant in comparison with the danger from infected fleas carried by rats" (5).

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To the Professional Public Health Worker

You, like the specialist in medical and other fields of science, know how important it is to be informed on current knowledge in your specialty. And, for the most part, you rely on the first-hand availability of the leading journals and periodicals in your specialty.

But as more becomes known of public health practice and research, the more complex this science becomes. There comes too the need to relate the activities of all its component disciplines—the members of the family of public health—one to the other, and each to the whole. And for each specialist there is a need to read regularly the journals devoted to unifying the family of public health. *Public Health Reports* is such a journal.

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Public, Professional, Industrial Allies

In Sanitation

By MARK D. HOLLIS, C.E.

UNTIL RECENTLY, three classic approaches have dominated the public administration of sanitation. The most primitive approach by the sanitarian was to carry a big stick. A more sophisticated approach was to speak softly and carry the big stick in a velvet glove. With the advent of epidemiology, it proved effective to speak cogently and to carry a slide rule. Today we have reached a point where public officials may expect sanitation to prevail mainly on a cooperative basis. The pressure to comply with approved sanitation practice now rises less from a fear of epidemics or of legal sanctions and more from a desire for good living and common realization of mutual interest. The activities of official health inspectors have been augmented and to a great extent reconstructed by the emergence of sanitary habits, practices, and customs in the general population and in industry.

The emergence of the modern mood in sanitation has stimulated the following comments on its development.

From Resistance to Collaboration

At the outset, it may be well to recall that advances in sanitation never have come easily. It is only human to resist change, and, to a moralist, resistance seems to be compounded when the change is beneficial. Impatient with such resistance and perhaps imbued with a

deep sense of righteousness, the sanitarian in the past tended to resort to police power rather than rely upon persuasion.

The dilemma of the early sanitarian was expressed in Lemuel Shattuck's eighth recommendation: that "Local Boards of Health endeavor to carry into effect all their orders and regulations in a conciliatory manner; and that they resort to compulsory process only when the public good requires." He commented, "In carrying a public measure into effect, the favorable opinion and cooperation of the people is desirable." But Shattuck did not feel that such cooperation was essential. Rather, he cited the summary power of the Commonwealth and its "duty to *interfere*" to remove a health hazard. "Public safety requires it—human life demands it," he wrote (1).

Sir Edwin Chadwick, the author of the modern sanitary awakening, was deposed from office for his zeal (2). His determination to clean up London created such a storm of opposition that the *London Times* commented in 1854, "Aesculapius . . . in the form of Mr. Chadwick [has] been deposed, and we prefer to take our chance of cholera and the rest than be bullied into health—England wants to be clean, but not to be cleaned by Chadwick."

So much has the attitude toward sanitation changed that today the public appeals to the professional sanitarian and the public health official for advice and guidance. As to sanitation of interstate carriers, a direct responsibility of the Public Health Service, there has been a distinct gain in cooperation even within the past 5 years. For example, the Joint Com-

Assistant Surgeon General Hollis is deputy chief of the Bureau of State Services and chief engineering officer of the Public Health Service.

mittee on Airline Sanitation, composed of representatives of the Public Health Service, the airlines, and catering companies, has found that commercial interests are eager to establish and comply with the committee's recommended sanitary requirements. These are now advanced almost to the point of formal publication. Progressive leaders of the restaurant trade have shown a similar spirit. Several railways have provided dining car supervisors, trained in sanitation practices, to conduct inspections to meet and even supplement Public Health Service requirements. Progressive railways go well beyond the essential requirements of dining car sanitation. Such efforts permit a public inspector to become more of a guide, teacher, and counselor and less a detective or policeman.

An increase in private assumption of responsibility for sanitation certainly does not warrant the abdication of State responsibility. Nevertheless, evaluation of health department sanitation services in the future may well consider how much of the activity conducted at public expense might be conducted by private enterprise with greater efficiency and economy. The Public Health Service's evaluation of the big stick policy has led to placing primary and major emphasis upon education and technical guidance. All the Service handbooks on sanitation practice and standards stress the technique, the purpose, and the advantage of sanitation rather than legal requirements and penalties.

The fall of Chadwick did not terminate the assumption of summary power by State authorities, nor did it quench the zeal of other sanitarians who fought for public health reforms, with or without power to install them. Meanwhile, experience has demonstrated what the prophetic Shattuck assumed that "the favorable opinion and cooperation of the people is desirable." We have learned to appreciate how much enforcement is an extravagant waste of time that might be spent more productively on guidance. We have come to understand the frustrations in a policy that condemns the sanitarian to repeated inspection of chronic violations. And we have come to see that the development of a cooperative program of sanitation standards, education, and compliance will

reduce routine inspections and enforcement actions by health officials and improve sanitary conditions.

This transition in policy did not occur overnight. It had its origin in the first stirrings of modern sanitation. We are not even near the end of the passage. Still it seems that a century of public health practice has brought to adolescence if not to maturity the ideal of sanitation imposed by self-discipline and cooperative action.

Institutions for the Modern Mood

In response to this changed situation, we have developed relatively new health institutions. These institutions appear to be genuine mutations in the social evolution of public health, if their development can be said to resemble the origin of species. Not only are they genuine mutations, but they were to be expected. Social history accepts the fact that the modern corporation, the cooperative association, the trade unions, and the industrial unions were born to meet emergent economic needs, and that interstate authorities, regulatory commissions, and associations for trades, professions, and governments were formed within the past few generations to meet specific administrative needs. The necessity for such new institutions today may seem obvious, but few are able to discern such a need when new social forms and institutions are in embryo.

The field of public health in the past century has had other mutations. We have seen the development of the professional organizations of medicine, sanitary engineering, nursing, and dentistry, the formation of boards of health and departments of health, the growth of public hospitals and health centers, and a proliferation of research institutions, clinics, laboratories, and insurance systems. These institutions have resulted from a broadened appreciation of health practice. The recognized domain of health work has become so broad that today's employees in public health agencies and the professions named above account for but a small part of the total economic activity devoted to protecting and improving the health of the community.

Since the beginning of the public health

movement, there has been a valuable auxiliary force of volunteers, from Florence Nightingale to a host of national and community voluntary associations. Voluntary organizations today play a most useful role in securing popular understanding of public health programs, and for supplementing private health services with experiment and research.

In addition to such voluntary public and professional organizations, we have a major category of those who are public health servants largely by association. They are not always conscious members of the open conspiracy to improve public health. Much of the important activity in fields bearing directly on public health is under commercial management which is often unaware of the full importance of its health role, because it operates primarily with technical or economic objectives. Such management is neither indifferent nor hostile to public health. It is simply for the most part not primarily directed toward health goals. The gain to health is coincidental if not accidental. Nevertheless, no one will deny the contribution of such enterprises as soap, paper, pesticide, cement, or steel production to the elevation of health conditions. In the large sense, nearly everyone is in business for our health. Usually, where economic and technical enterprises have come in direct contact with the public health profession, as in the milk and food industries, managerial cooperation with health authorities has been predominantly sincere and effective. In the control of pollution in water and in atmosphere some of the most practical and effective support is found among enlightened managerial figures who believe that what is good for the community is best for private industry.

A Meeting Ground

In this situation, it was to be expected that institutions would emerge to provide a common ground where various elements, whether engaged directly or obliquely in public health work, would meet to work out a common program. The need for such a meeting place has been intensified by the extraordinary specialization and compartmentalization of health work.

The need for a meeting ground was suggested also by the fact that, in this complex, specialized society, the business of bringing together strangers who ought to meet in a common interest has in itself become something of a specialty.

Consequently, allied interests have developed such institutions as the National Sanitation Foundation, the National Safety Council, the Public Health Committee of the Paper Cup and Container Institute, the Chemical Products Labeling Committee, the 3-A Committees on Sanitary Standards for Dairy Equipment, and many others. While there are many variations in their structure, it is clear that these organizations are a new breed. Not purely public, private, professional, or commercial, their distinguishing characteristic is that they represent a joint effort to blend the public interest, prevailing legal requirements, the best scientific judgment, and sound commercial practice in the economic activities that bear on sanitation.

The Public Health Service finds itself involved with such organizations in several ways. Representatives of the Service work with representatives of commercial interests and others on multilateral committees organized by such responsible agencies as the National Research Council. We also form bilateral joint committees with industry, such as the one which is drafting a recommended code for poultry sanitation. And we serve as consultants to unilateral industry committees such as the committee which is developing sanitation standards for the baking industry. With so many possible permutations of such arrangements, each of these organizations is free to determine what operating structure best serves its purpose. The chances of successful cooperation among the allied interests would seem to require joint contribution of funds or services from the respective public, legal, scientific, and commercial interests. For this reason, and because of its association with the Committee on Food Equipment Standards, the National Sanitation Foundation is a good example of the cooperation that seems likely to characterize a great part of sanitation activity in the future.

Like these other organizations, the National Sanitation Foundation was an organic response

to a social challenge. The men who have assisted its growth declare that they have been the instruments of this response, rather than the authors.

The need for a common meeting ground for the allied interests in this phase of sanitation was not obvious to all. Nevertheless, it was a genuine need, a popular need. This need could not have been satisfied by existing agencies in public health, working by themselves alone. The overburdened health departments too seldom have time to look up from their heavy tasks to see new opportunities ahead. And professional organizations cannot seek to meet the needs of industry any more than a trade association can presume to serve a profession. But an independent organization like the National Sanitation Foundation can combine these interests. Such organizations make it easier for representatives of industry, the professions, and public agencies interested in a particular phase of public health work to combine their energies and to achieve common objectives, such as uniform equipment standards for the food service industry. Their services may be broadened even further to the extent that labor and consumer organizations take part in their future activities.

Uniform Sanitary Standards

The need for consistent standards for food equipment gave the National Sanitation Foundation its first concrete and specific enterprise. Similarly, professional societies and public health agencies have made many useful contributions to resolving the need for standards in this field. A great deal of progress has been achieved by the milk industry and health agencies working through such groups as the 3-A Committees on Sanitary Standards for Dairy Equipment. Similar joint action has been taken by those associated with the Baking Industry Sanitation Standards Committee. Also, many individual food equipment companies have been working with public health agencies directly to develop sanitary standards for their respective products. The Foundation was founded in response to a feeling among members of the food industry that a broad approach

was required to progress specifically against variations and gaps in municipal regulations and their interpretations. The available machinery for resolving the variations and filling the gaps in such regulations did not satisfy the needs of the responsible interests concerned. For the purpose of accelerating the solution to some of these difficulties by practical, democratic, and reasonable means, a cooperative body was formed on invitation by the National Sanitation Foundation.

This body, the Joint Committee on Food Equipment Standards, represented five national professional sanitation organizations and the Public Health Service. Included were the International Association of Milk and Food Sanitarians, the National Association of Sanitarians, the Engineering Section of the American Public Health Association, the Conference of State Sanitary Engineers, and the Conference of Municipal Public Health Engineers. The committee was organized following the Foundation's first National Sanitation Clinic, a 1948 meeting in Ann Arbor. More than 400 guests of the Foundation met in this clinic to discuss food sanitation. Participants in this meeting included authorities from local, State, and Federal Government agencies, from commerce and industry, and from universities and professional associations. They recommended development of standard practices and equipment criteria, and simultaneously the establishment of a testing laboratory that would serve industry, government, professionals, and the public.

The fact that the National Sanitation Foundation is supported by contributions of funds from industry and services from government, professional associations, and the university world puts it at the fulcrum in such a balance of interests in sanitation.

The activities of the Joint Committee have been described elsewhere (3). It is sufficient to note here that the series of standards for the food industry which were worked out by the committee in consultation with industry, government agencies, and professional societies are being published by the National Sanitation Foundation. New equipment which meets these standards will be authorized by the testing laboratory to carry the Foundation's NSF

insigne, as an aid to all concerned with appraising equipment design and construction. Thus, the doubts and problems of the industries and the regulatory agencies both should be materially reduced, because there is every ground for confidence that as much cooperative effort will go into the application of these standards as went into their creation.

The first standards published apply to soda fountain and luncheonette equipment (4). Standards for food service equipment followed (5), and standards for spray-type dishwashing machines are next in view. The dishwashing machine standard, based largely on research conducted since 1944, has been delayed pending further study. All such publications are a welcome and useful supplement to other efforts to raise sanitation levels, such as the operating codes recommended by the Public Health Service.

Since manufacturers and health authorities joined in drawing these standards, it is expected that they will be acceptable to every city and State health department and that they will resolve differences among local health ordinances governing such equipment. This achievement is indeed a milestone in the progress of health services.

The Means to an End

But the significance of this movement does not lie with the standards so much as with their purpose—to contribute to health by improving the American environment. Standards are not an end in themselves. They are merely a means to improve living and working conditions.

Organizations like the National Sanitation Foundation, by such practical devices as these publications, may labor aggressively and experimentally for progress in public health. With a university background, they can be both informed and impartial. They may contract freely, as private institutions, to work on a specific problem proposed by a responsible source. At the same time, they should be bound by professional and official associations to seek the public advantage.

Through its laboratory and insigne, the Foundation aims to encourage acceptance of

the Joint Committee standards. The laboratory will furnish experimental evidence to evaluate equipment. The seal will identify equipment that equals or surpasses basic standards. Such a seal of itself does not assure the sanitary use of equipment. Its significance depends upon the reputation of the forces behind it. This is true of every symbol, from a common trade mark to the American flag.

As the activity of the National Sanitation Foundation laboratory expands, its seal will gain in significance. But the value of such a seal fundamentally will be reflected by its use by industry and by regulatory agencies. No system of laboratory examinations, legal penalties, or other enforcement techniques, however careful, is as effective as free agreements honored among mutually contracting parties.

Private institutions like the Foundation are especially free to encourage experiment with public health methods, including educational activities. They can undertake activities which meet deeply felt needs of community action programs in public health. The potential educational power of such cooperative organizations is one of their most promising aspects.

There is still, after a century of public health work, a serious need for community campaigns of health education which a public or professional agency cannot ordinarily satisfy. A governmental agency is obliged to be conservative in education activity, in deference to the principle that government is the servant of the people and not their schoolmaster. Professional organizations by their nature are more concerned with the special interests of their members than with general needs of the public.

Private organizations, however, if sufficiently endowed, can encourage a bold and experimental approach in educational services.

If there is an element of rivalry and competition in such educational programs, all the better. If the community is to have its money's worth from health education, citizens ought to enjoy an opportunity to compare the relative performances of different kinds of organizations and institutions. In competition of this kind, it is unlikely that the public will be the loser.

The major value of these new institutions,

however, is not that they may be more zealous, dynamic, and enterprising than professional or official bodies. These virtues are welcome, but they are but a supplement to their prime function—to provide a common forum and instrument for allied interests in the field of sanitation. Should they contribute further to stimulating comprehensive sanitation activities (6), helping the social forces of the Nation to put a new face and a new heart into American neighborhoods, they will more than have fulfilled their promise.

Summary

In summary, there has been a need for institutions which will accelerate agreement and action on progressive sanitation measures among the many allied interests in this field. The organizations formed by these allied interests have already encouraged cooperative action among governmental, professional, and industrial organizations. They have helped to achieve a uniform approach to sanitation design and construction of equipment. As they de-

velop, they can help also to satisfy some of the needs for health education and research. The competitive aspects of this situation should be healthful in every sense of the word.

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Dining Car Sanitation Award

The Erie Railroad has been awarded a special citation by the Public Health Service for being the first major line whose dining cars have all been awarded the Certificate of Sanitation under the cooperative inspection program of the railroads and the Public Health Service.

To achieve the Certificate of Sanitation a dining car must receive a rating of at least 95 percent by a Public Health Service dining-car inspector. The inspection is based on a check of 128 separate items involving both basic construction of the car, particularly the kitchen and the pantry, and maintenance of sanitation. The standards for dining-car sanitation were established several years ago by the Public Health Service in cooperation with representatives of the railroads.

The citation was presented June 3 at a special ceremony in Jersey City.

The Value of Good Service Statistics In a Modern Health Department

By EVELYN FLOOK

WHAT ARE service statistics? Why are they needed? How are they produced, and how should they be used? What is their value to a health officer or to a health program director?

Every public health worker is apt to define service statistics differently and according to his own particular experience and interest. A useful definition is this:

"Service statistics in public health are numerical measurements of services rendered to individuals and to the community through public health programs."

That definition, developed by the Working Group on Service Statistics of the Public Health Conference on Records and Statistics, represents a composite formulation of operating statisticians associated with local, State, and Federal health agencies (1, 2).

Service to People

Perhaps the most important concept concerning service statistics is that they should reflect

Miss Flook is public health adviser in the Division of State Grants of the Bureau of State Services, Public Health Service. This paper is based on a talk before the statistical and clerical section of the Southern Branch, American Public Health Association, at the Branch's 22d annual meeting in Atlanta on April 23, 1953.

For the past 2 years, Miss Flook has been chairman of the Working Group on Service Statistics of the Public Health Conference on Records and Statistics.

service to people and not attempt merely to measure volume of activity of the health department staff. There is a fine distinction between the traditional activity counts—enumerations of nursing and clinic visits for various purposes or of sanitary inspections of different types of establishments—and the kind of statistics which focuses attention on numbers of persons served and types and amount of service received. With the traditional counts, quantitative evidence is being accumulated to describe how each public health worker spends his time—how much effort is being expended for each separate program. With the latter type of statistics, information is being collected on the results of that effort.

"Measurement of results" then, is the key to what we want to achieve with service statistics. The term "service yield indices" is an apt phrase. Just as a farmer finds it necessary, if he is to know whether he is operating at a gain or loss, to reckon the number of bushels of wheat or bales of cotton he gets per acre in return for the labor and expense of production, so the public health worker must calculate the service being rendered to the community in relation to the need for service.

Discussing operational statistics from the viewpoint of a local health administrator, Mattison (3) notes that "it is remarkable, with a few outstanding exceptions, how little really useful information has been available to us health officers in the past in the way of quantitative relationships between morbidity, mortality, population characteristics, and public health services."

Service statistics, to be meaningful, must be related to such baseline data as population by age groups; morbidity, natality, and mortality information; information concerning the health needs of special groups; information about health facilities, services, and personnel available under public, voluntary, and private auspices; information concerning housing, sanitation, and the nutritional and general economic status of the community; and information reflecting expenditures. True measurements of accomplishment cannot be arrived at by counting units of service alone. Quantitative relationships must be established between the services rendered and the health problems to be solved.

In reviewing data for administrative planning, Mattison also points out that unfortunately the one thing usually missing from the kinds of data usually collected in a local health department "was any cross relationship of services to population served or even associations of differing population patterns with differing specific mortality or case rates. Nor are the sanitation inspection figures usually related to the total need in terms of numbers of institutions of the various types inspected and results attained in securing abatement of violations for any particular inspection unit" (3).

For Program Guidance

Service statistics are needed as guides for the three main segments of health department administration: program planning, program operation, and program evaluation. The science of public health has developed to the point where it must be selective in its undertakings if it is to move forward consistently toward a goal of "positive public health" for all.

Intelligent evaluation, stemming from objective data, is the touchstone of progress for any health department. If the public health dollar is to accomplish the maximum good, it must be spent in the area of maximum need. Our efforts must be addressed to the most serious health problems, program emphasis must be shifted as the problems change, and, in each instance, methods used must be those producing the best results. To obtain assurance, there

must be continuous program evaluation and re-direction of planning when necessary.

Like other problems in contemporary society, public health problems are in a state of constant flux. The character of health needs has changed along with changes in the social and physical environment and improvements in the standard of living. Fifty years ago when the local public health movement began, many parts of this country were faced with epidemics of serious proportions; with outbreaks of such infectious diseases as diphtheria, smallpox, typhoid fever, and malaria; and with high maternal and infant death rates. Public health workers naturally turned to preventing and controlling epidemics, to curbing the infectious diseases, to insuring a clean and wholesome physical environment.

Over the years, however, the character of public health problems has undergone considerable change. While many communicable diseases have been virtually conquered, the volume of chronic and long-term illnesses continues to grow. The health of mothers and children has undergone constant improvement, but we are only beginning to look at the needs of the aging group in the population. Various safeguards have been developed to protect the physical environment, but the increased use of chemicals and other new substances creates hazards unknown or unappreciated in the past and in many instances still not fully comprehended.

Good service statistics help keep a modern health department modern. They help define the health problems of the community at any point in time. They help measure both the extent of a program and its effectiveness in relation to the problems. By thus appraising programs and charting paths of action, they furnish a basis for future program planning. If properly used, they can be a sensitive barometer of need for more or less attention to any given problem, in any particular location, at any special time or for change in methods or techniques. Just as it is wasteful to continue the performance of outmoded public health practices long after the need for them has passed, so also is it disastrous to discontinue prematurely the fight against a public health problem. Eternal vigilance is essential if gains already

made are to be maintained. Only then can new problems be attacked in orderly process.

And what place do good service statistics have in program operation?

Service statistics should, for the most part, be a byproduct of administrative operation of a program. Maintenance of records, and compilation and interpretation of statistics, should be an integral part of program management. Only a few examples of the many uses of service statistics for program management need be mentioned. Reports of clinic attendance might suggest changes in clinic policy, dates, hours, or location in order to adjust services to needs. Such reports may also be considered as leads to the effectiveness of home nursing visits. Total clinic visits related to physician time can be used to evaluate clinic policies. Broken appointments and failures to respond to recommendations are signals for closer scrutiny of operations to discover "soft spots." Summaries of program activities provide a basis for determining personnel needs and for justifying specific types of expenditures.

For the guidance of program operation, the value of periodic analysis of individual case records should not be overlooked. Case records of individuals served by the health department constitute the best source of service data in a well-conducted department. A comparison of performance as revealed in the record against the department's stated plan and criteria of service permits a critical appraisal of the adequacy of actual performance. It is an excellent tool for supervision.

Compilation of service statistics by periodic case record analysis is less expensive and more valuable than the accumulation of a vast quantity of uninterpreted data, which is still a wide practice among public health agencies. To illustrate:

If all known tuberculosis cases are analyzed once a year to determine how many are patients in the hospital, how many are patients at home, the sputum status of those at home, and the number of tuberculous individuals at home who were last examined more than a year before, attention is being focused on a specific problem and the health department's success, or lack of it, in keeping individuals under supervision.

If, in addition, records of all new tuberculosis cases are examined to determine the stage and age of the case, attention will be drawn to the success of case finding.

A summary of this type of data provides appropriating bodies with a better understanding of the health department program and its needs than does the traditional count of visits, inspections, admissions to broad categories of service, and so forth. In order to demonstrate the advantages of related statistics, it may be necessary to furnish both types during the transition period, although that is questionable. Public officials ask for evidence of health department effort in terms of gross volume because that is the variety of information they have become accustomed to receiving. There is nothing mysterious about the more searching kind of statistical information, and there is no real reason why it could not be substituted for straight, unrelated counts.

Good Service Statistics

What characterizes good service statistics?

First, they must be developed in line with clearly defined program objectives. Sound statistics do not just happen. They are based upon previous determination of the precise kind of data needed for each purpose. Each item of information must be significant for the specific purpose it is designed to serve, and the exact purposes to be served have meaning only in relation to what a program is designed to accomplish.

Second, the information accumulated must be valid and readily available. The units of measurement to be used should be determined jointly by the program directors and the statisticians prior to beginning their collection. Such program personnel as physicians, nurses, nutritionists, social workers, health educators, and statisticians should take part in developing plans for the collection of information needed.

Third, good service statistics should be limited to a scope and volume commensurate with reasonable cost, time, and effort of production. Collection of statistics—no matter how good—as an end in itself should be discouraged.

Let us consider a few concrete examples of good and not-so-good service statistics. Mere

counts of activities, without being related to the need or demand for a service, add little to knowledge of the problem or to program planning. For instance, in regard to immunization, it is the level of immunization in the community that is important. Counting the number of immunizations given at specified places falls far short of providing that essential knowledge. But the more valuable service statistics—those measuring services to individuals—are based on counts of the patient load according to: whatever breakdowns (age, sex, race, residence, and so forth) are significant; and the categories and amount of service received, grouped so that service is related to the particular health problem. As another example, more useful information on maternity services can be obtained by relating antepartum, delivery, and postpartum services to the women who were delivered of babies within a specified period of time than by using unrelated counts of the three types of services.

Shown in the box below is a pattern of service statistics for a tuberculosis screening activity which relates activity to the problem, specifically, the number of persons screened to the population concerned. Visualize these statistics on a descending scale, as illustrated, with each indented entry a fraction of the preceding one.

By such relationship of information, the number for whom rechecks were recommended, the percentage of tested individuals who had evidence of tuberculosis and the number of diagnoses confirmed by private physicians provide a

guide to the validity of the test. The number for whom rechecks were recommended and completed is an indication of the adequacy of followup. Reporting on this basis makes possible good comparison of services between various reporting areas and between selected periods of time.

Use of Information

Even though we accept in principle the importance of having good service statistics in a modern health department and apply sound criteria for accumulating meaningful statistics, tabulation of such data does not in itself provide for its optimum utilization. To be of real value, information should not only be useful, it must be actually used. We are fortunate in having available a few guide lines to use of statistical data as well as to production.

The periodic review of individual case records has already been mentioned. Case record analysis should be made regularly, but it should be limited to stated times: quarterly, semiannually, or annually. This reduces handling and permits more thorough analysis of each service.

Perhaps the most orthodox method of presenting statistical data is in the form of summary tables or reports. Reports should be prepared only to fulfill definite purposes. The frequency with which they are prepared must be determined locally, depending on the use to be made of the information assembled. Caution is urged against more frequent tabulations than are justified by actual use. Compilation of service statistics on a calendar-year basis is usually most satisfactory for comparison with baseline data. Where statistics are used for fiscal purposes, compilation on a fiscal-year basis should supplement, but not substitute for, calendar-year data. Narrative analyses and graphic presentations are important adjuncts to statistical tables in the interpretation of numerical measurements of service. Such interpretation includes correlation with baseline data, with expressions of needs for services, and with program objectives.

More extensive use should be made of special, short-term studies, aimed at answering specific questions, as a device for reducing the number and complexity of routine reports. Routine re-

Pattern of Service Statistics

Total population.

Percentage of population screened.

Population (numerically) screened.

Number of films read.

Number referred for large X-ray.

Number receiving large X-ray.

Number referred to physician.

Number of referrals completed.

Number diagnosed as active.

ports should concentrate on minimum essentials for reflecting program activities and should avoid overrefinement of data. Special studies permit more critical analysis of a selected segment of a program for a limited period of time and do not overburden the staff indefinitely with a vast amount of details.

Some types of service statistics which might be obtained through special studies are: determination of levels of immunizations; evaluation of specific new services or program techniques; changes in behavior resulting from health department activity; determination of reasons for lapses in attendance at clinics or for failures to complete immunizations; comparison of effectiveness of individual interviews versus group conferences; and time and cost studies.

Summary

Several points may be suggested, then, for the guidance of public health workers concerned with numerical measurement of public health services:

Service statistics should reflect service to people. They should not attempt merely to enumerate volume of activity of the health department staff.

Service statistics are needed by modern health departments for program planning, program operation, and program evaluation.

Full value cannot be derived from service statistics unless they are related to baseline data. Organized methods are needed for bringing together the several groups of data so that quantitative relationships can be established between

the services rendered and the health problems to be solved. The acid test of service statistics is whether they portray results of public health effort.

Good service statistics must be developed in accordance with clearly defined program objectives. In scope and volume, they should be limited in terms of cost, time, and effort of production commensurate with the need they must meet and the uses to which they are put.

Frequently, preparation of recurrent statistical reports can be simplified by substituting special studies for routine collection of complex mass data.

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Health Education via Television

By JOSEPH GORDON

WHILE THE CONTROVERSY over education via television continues in the press, in periodicals, in educational journals, and around many a conference table, a modest number of TV stations working with medical and other health agencies have unpretentiously launched regularly scheduled health video programs. Most of these programs have been dedicated to promoting better health habits and attitudes in the individual as well as in the community which the TV station and the health agency serve.

How well these objectives are being met remains to be evaluated, but favorable audience response to current programs is a good indication that health education over TV fills a definite need for the citizen.

In 1951, in an effort to evaluate the status of health education via television on a nationwide basis, some 110 questionnaires were sent by the Baltimore City Health Department to all active TV stations over the country. Of the 64 questionnaires returned, 28 television stations which were not carrying regular public health education programs indicated they would carry such a program provided it were sponsored by a health agency. Sixteen TV outlets replied

that they then carried sporadic health telecasts throughout the year in conjunction with special health drives; but only seven stations were producing regular periodic health programs. It is surprising that, with this interest evidenced by TV stations, so few health agencies have grasped the opportunity to utilize this new and effective dimension for health education.

Why are many health departments, medical societies, and other health agencies not taking advantage of the opportunities afforded by TV for health education?

Is it because of a lack of aggressiveness on their part?

Is it because of their skeptical attitude toward the value of television as a medium of education?

Is it an unfamiliarity with a technique which resembles that of motion-picture production?

Or is it essentially because the costs of production are believed to be excessive?

Whatever the answer, a delineation of the Baltimore City Health Department's experience in television is offered here with the hope that it may help to refute some of these unwarranted conjectures and that it will encourage those who wish to utilize television as an aid to promoting better health.

Background

Baltimore's program (1-3), a 15-minute weekly series bearing the title "Your Family Doctor" rests on a triangular foundation. It is jointly sponsored by the Baltimore City Health Department, the Medical and Chirurgical Faculty of Maryland (the State medical society), and WMAR-TV, a local television station. This triple bond gives the television series its

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in community health education



Left (reading down):

A fifth-grader shows the doctor what he's learned about dental care.

A mother-to-be learns about the Rh blood factor.

Adolescent problems. The doctor talks these over later with a guest specialist.

Looking for glaucoma. The doctor explains the leading cause of blindness among adults.

Below (left to right):

Sinusitis is discussed with a guest specialist.

Red Cross instructors demonstrate the new method of artificial respiration.

The zoo director tells about snakes and their bites.

Prescription-writing and drug-compounding are explained.



strength. The city health department is responsible for planning and programing. The medical society makes available consultants who act as advisers or guests on the program. And the TV station donates as a public service the air time and the technical personnel for telecasting.

"Your Family Doctor," the weekly program, was inaugurated on December 15, 1948. There have been only three cancellations since then, and these were due to election commitments.

Participating in this first telecast were the mayor of Baltimore, the president of the Medical and Chirurgical Faculty of Maryland, the chairman of the council of the faculty, the city health commissioner, "Dr. John Worthington" played at that time by the former director of the bureau of health information in the city health department, and Dr. Worthington's "office nurse," played by a public health nurse.

The program opened with the mayor's special remarks on its aim and his acknowledgment of the efforts of the physicians of Maryland and the television station in making the TV health series possible. The president of the State medical society spoke about the importance of the family doctor in protecting and promoting personal health and the role he plays as teacher and family counselor. The commissioner of health described the kind of telecast to be presented each week. The "doctor" and his "nurse" gave a short dramatic presentation in the setting of the "doctor's office."

Purpose and Authenticity

"Your Family Doctor" is designed to promote interest in and understanding of personal and community health. Its prime functions are to increase the public's knowledge of the basic practices for keeping well; to encourage consultation with the individual's family doctor when there is any doubt about illness; to present public health problems and their local application to the community; and to inform and familiarize the public with the activities of the local health department. In essence, "Your Family Doctor," through the medium of "Dr. Worthington," attempts to join, with skill, education and entertainment in the encouragement of good healthful living.

Overall responsibility and supervision of program production (4, 5) rests with the director of the bureau of health information in the city health department. Programs are selected on the basis of timeliness and need by a television committee composed of the commissioner of health, the assistant commissioner of health, key city health department administrators, the scriptwriter, the studio producer-director, and the director of the bureau of health information, who acts as chairman of the committee. Besides the selection of program topics, the committee designates well-known authorities as specialist advisers for each program.

The following procedure insures the authenticity and accuracy of each program:

A preliminary conference is held to decide on the information to be presented. The method of presentation is discussed and decided on. The conference is attended by the specialist adviser, the scriptwriter, the studio producer-director, and the director of the bureau of health information.

After the preliminary conference, a script is prepared and submitted to the director of the bureau of health information for his approval.

The director of the bureau of health information and the specialist adviser critically examine the script. They check on the accuracy of each statement and for the possible omission of essential facts.

Final approval is given, and copies of the script are prepared by the bureau of health information for distribution to the studio and the cast. The participants memorize their lines, in this way avoiding the possibility of misrepresentation.

Cast and Properties

The part of Dr. John Worthington, the central character of each weekly presentation, is portrayed by a staff member of the city health department who has had professional acting experience. "Dr. John Worthington" was chosen as the name of "Your Family Doctor" because he was one of Baltimore's first health officers, appointed during the yellow fever episode of 1792.

Other members of the cast are recruited from the television studio and from Baltimore the-

atrical groups. Persons with dramatic experience are preferred as actors, but often staff members of the city health department volunteer their services. All participants contribute their talents without charge.

Properties are assembled by the television studio and the bureau of health information. Property items (props) have been contributed to the programs by the Johns Hopkins University and Hospital; the University of Maryland Medical School and Hospital; the Baltimore city and county departments of education; the Public Health Service and the Food and Drug Administration of the Department of Health, Education, and Welfare; the Armed Forces Institute of Pathology in Washington, D. C.; and numerous voluntary health agencies.

Cost of Production

Scriptwriting is the main item of expenditure. Scripts are written by a studio staff member for a fee of \$20 for each script. Having a studio member write the scripts has been a workable and satisfactory arrangement since the scriptwriter is then familiar with television techniques and the available studio property items.

During 1951 and 1952 an additional outlay of \$10 a program was made for the services of a professional actor who portrayed "the family doctor." The writing and acting expenses for this period totaled \$1,560 per year. An additional \$200 a year is estimated for the production of props—photographs, charts, diagrams, drawings, postage, transportation, and incidentals. Stencils and paper for script reproduction are estimated at \$100 a year. The total annual cost to the health department, excluding the services of staff members of the bureau of health information, was \$1,860 a year. This sum, in the light of approximate expenditures for other health educational media, films, exhibits, leaflets, and posters, is not excessive: Rather, it is a small sum when it is compared with the costs of commercially sponsored programs and when one considers that the health message reaches thousands of persons of all ages more easily and personally than any other medium of mass communication. The outlay can be greatly minimized by writing the pro-

gram within the health department and by drawing on a staff member of the department for the regular weekly appearances.

The Telecast Format

Each health telecast follows a standard format which on occasion is varied to meet the needs of the program. In general, the following time sequence is typical of the standard program format:

Opening scene (30 seconds). A "live" or filmed dramatic sequence to catch audience attention.

Standard titles (30 seconds). Superimposed over opening scene whenever appropriate.

Body of program (10 to 12 minutes). This may take any form: a health drama, a series of experiments, an illustrated lecture, a film, or any combination of these.

Guest specialist (usually 2 to 5 minutes, but time varies according to subject). Outstanding personalities are frequently invited to appear on "Your Family Doctor" in order to highlight the program and lend added authenticity. Since the program is sponsored by the city health department and the State medical society as part of their health education program, their teamwork makes it possible to obtain such personalities. Guests in the past have included members of the Johns Hopkins University and Hospital, the University of Maryland and the University Hospital, the city department of education, the voluntary health agencies, the American Red Cross, the State and city medical societies, the health department, and other municipal agencies.

Ending. Each program ends with "Learn to do your part in the prevention of disease."

Range of Subjects

A summation of the health subjects covered in the series is given in the accompanying table. Included under the communicable disease control classification are 9 programs on tuberculosis and 4 on respiratory ills. Other programs in this category were concerned with poliomyelitis, diphtheria, typhoid fever, measles, smallpox, ringworm, Rocky Mountain spotted fever, and hospital services and research in communicable diseases. Five programs on sanitary

Range of 230 subjects covered in weekly telecasts by broad classifications, Dec. 15, 1948–May 30, 1953

Classification	Number of telecasts	Percentage of total telecasts
Total.....	230	100.0
Communicable disease control.....	27	11.7
Food and nutrition.....	22	9.7
Maternal and child care.....	21	9.2
Accident prevention.....	20	8.8
Environmental sanitation and housing.....	14	6.1
Mental health.....	13	5.7
Special health department services.....	10	4.4
Dental care.....	8	3.5
School health.....	7	3.0
Heart and circulation.....	7	3.0
First aid.....	7	3.0
Conservation of eyesight.....	7	3.0
Cancer.....	6	2.6
Conservation of hearing.....	5	2.2
Anatomy and physiology of body systems.....	4	1.7
Diabetes.....	4	1.7
Geriatrics.....	4	1.7
Industrial hygiene activities.....	4	1.7
Lead poisoning in children.....	4	1.7
Civil defense.....	3	1.3
Historical—medical discoveries.....	3	1.3
Miscellaneous personal and community health.....	30	13.0

meat and milk inspection services are included in the food and nutrition group. Accident prevention covers home accidents, vacation hazards, and water safety. Special health department services include telecasts describing laboratory services, vital statistics, and special health district activities. Programs in the miscellaneous group were devoted to the work of the State medical society; the American Red Cross blood drive; the recruitment of student nurses; the activities of the Instructive Visiting Nurse Association; the work of the city's chief medical examiner; several community health drives; and a variety of ills including cerebral hemorrhage, sinusitis, allergies, appendicitis, and multiple sclerosis.

Audience Response

Prior to, and during 1950, according to WMAR-TV survey records of the television audience of metropolitan Baltimore (popula-

tion, 1.3 million), the number of viewers each week of "Your Family Doctor" was estimated at no more than 20,000 individuals. Early in 1951, this number had increased to approximately 40,000 persons. By October 1951, the viewing audience had grown to an estimated 75,000. In November 1951, a rating survey revealed that more than 85,000 people were attracted to the program. Early 1952 ratings indicated a stabilization of this figure. After a brief summer decline, an October 1952 rating gave the program an audience of 125,000 persons, exceeding that of many commercially sponsored TV entertainment programs in Baltimore.

A measure of the program's effectiveness may be derived from an abundant correspondence stimulated mainly by offering free literature on health subjects. Our correspondents speak of "Your Family Doctor" as being an invaluable contribution to the community health of Baltimore, of their friends' favorable remarks, of the aid the program gave in putting over an important bond issue for a public hospital; others frequently ask for additional information on the topic of the week.

Summary

Baltimore's program is one in which health information and education emanate from the family doctor as he deals with his patients and their diseases. Not only is the family doctor interested in promoting individual health, he is also concerned with improving the health of the community. In accomplishing these aims, "Your Family Doctor" utilizes every available source of medical material and every practical audiovisual technique. In so doing, it has enlisted the cooperation of every important health agency in Baltimore, both official and nonofficial. That these efforts are well expended is evidenced by the increasing number of viewers.

Can public health agencies afford not to consider using TV as a medium for disseminating health information to the public? Television is an additional tool in the hands of the health educator. The skill and care with which he uses it can contribute to the better health of the individual and the community in which he lives.

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Training Courses in Venereal Disease Control

The Public Health Service Venereal Disease Research Laboratory at Chamblee, Ga., has scheduled refresher training courses to be given during fiscal 1954.

Two-week courses in the serology of syphilis will be given on the following dates:

1953	1954
Aug. 17-28	Jan. 11-22
Sept. 14-25	Feb. 8-19
Oct. 5-16	Mar. 8-19
Oct. 26-Nov. 6	Apr. 5-16
Dec. 7-18	May 3-14

Other courses scheduled are:

- Oct. 5-16, 1953: Management and control of syphilis serology by the regional laboratory (for assistant laboratory directors and senior laboratory staff members—includes review of interlaboratory training programs, regional laboratory evaluation studies, laboratory inspection procedures, demonstration of antigen check testing, and control serum preparation.)
- Oct. 19-23, 1953: Laboratory diagnosis of venereal disease (for public health physicians, laboratory directors and assistant directors).
- Nov. 9-20, 1953: Preparation and standardization of cardiolipin antigens used in serologic tests for syphilis (also to be given May 17-28, 1954).

Correspondence on these courses should be sent to: Director, Venereal Disease Research Laboratory, P. O. Box 185, Chamblee, Ga.

Diabetes Mortality by State for 1950

In 1950, the death rate from diabetes in the United States was 16.2 per 100,000 population. Final figures by State, recently released by the National Office of Vital Statistics, show considerable variation in this death rate from State to State. The diabetes death rate was lowest in New Mexico, where a rate of 5.6 per 100,000 was recorded, and highest in Rhode Island, which had a rate of 35.9 per 100,000. Seven States, New Mexico, Arizona, California, Alabama, Arkansas, Tennessee, and North Caro-

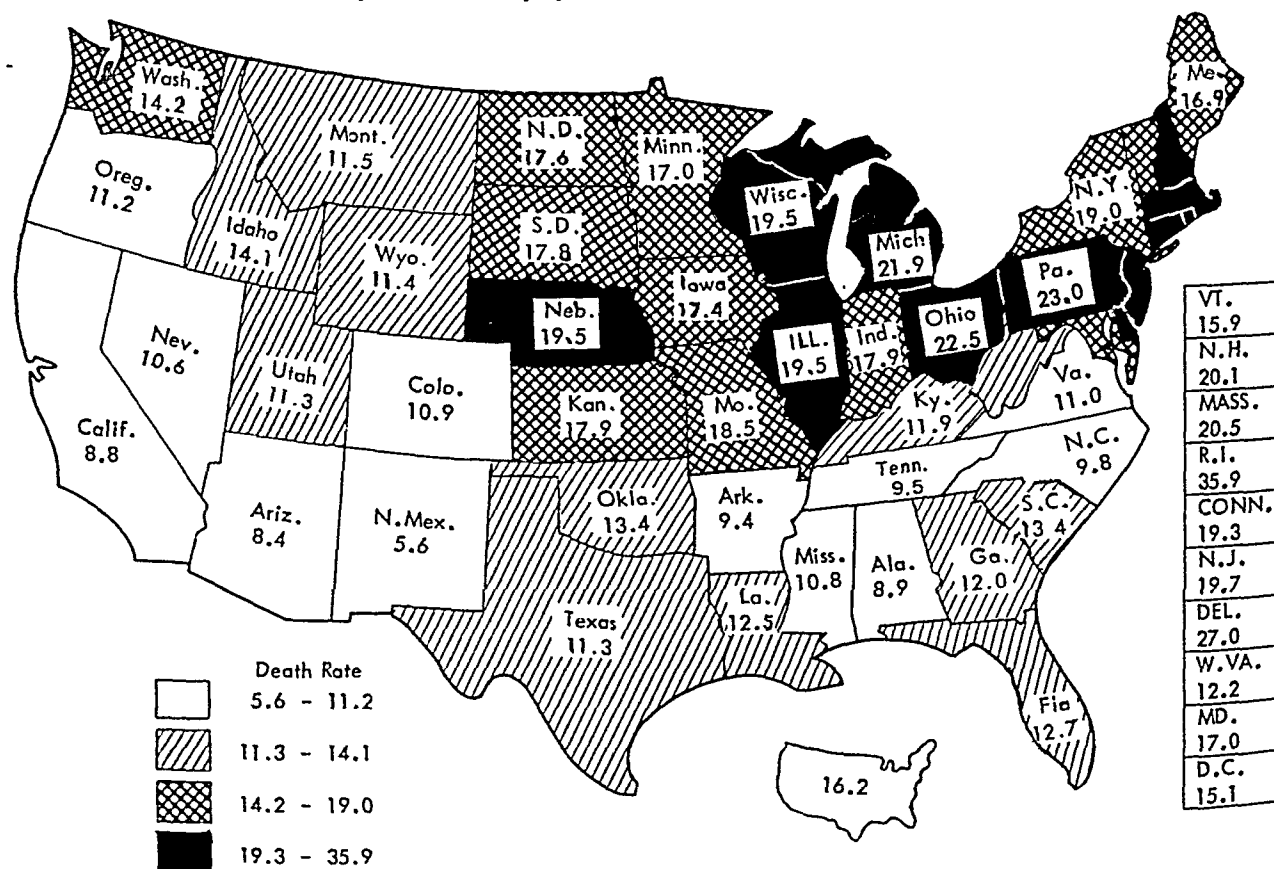
lina, had less than 10 deaths per 100,000, while rates greater than 20 per 100,000 were recorded for New Hampshire, Massachusetts, Michigan, Ohio, Pennsylvania, Delaware, and Rhode Island.

An array of the States by their 1950 diabetes death rate and division by quartiles shows a definite pattern on the map. Generally, the southern and western States have low death rates, and the northeastern and north central States have high rates.

Many factors undoubtedly influence the variation in the diabetes death rate among States and among regions. The differences may be due to real variations in the death rates for diabetes

This report was prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.

Diabetes deaths per 100,000 population in the continental United States, 1950



because of varying case fatality rates or varying prevalence rates. They are in part reflections of differences in the social, economic, and cultural patterns of the population groups, and differences in the availability of medical facilities and in methods of reporting causes of death.

Another important factor to be considered in comparing the death rates among the States is

the age, race, and sex composition of their populations. States having a high proportion of older people would be expected to have a high death rate for this disease. The rate among the nonwhite population (14.4 per 100,000 population) was slightly lower than that for the white (16.4); while for females, the rate (19.9) was considerably higher than for males (12.5).

Environmental Health Training Courses

Twenty-three training courses will be conducted during fiscal 1954 by the Environmental Health Center of the Public Health Service at Cincinnati, Ohio—15 in the various aspects of sanitation and 8 in radiological health.

These short courses are given for professional personnel from State and local health departments, water pollution control agencies, the Public Health Service, other governmental units, educational institutions, and industries cooperating with these agencies in environmental sanitation programs.

The advanced sanitation courses planned during 1953 and 1954 are:

Sept. 17-18: Fluoride analysis.
Sept. 23-25: Seminar on individual household sewage disposal systems.
Oct. 12-16: Membrane filter in bacteriological analysis of water.
Nov. 2-6: Nuisance organisms in water supplies.
Nov. 30-Dec. 11: For chemists—water pollution investigations.
Jan. 11-15: Bacteriological examination of water.
Jan. 18-22: Bacteriological examination of milk and dairy products.
Jan. 25-29: Food sanitation training.
Feb. 16-18: Phenol determination.
March 8-19: For sanitary engineers—water pollution abatement programs.
April 7-9: Bioassay of industrial wastes.
May 3-7: Membrane filter in bacteriological analysis of water.
May 19-21: Analyses of metals in industrial wastes.
June 8-11: For aquatic biologists—water pollution control.
Emergency sanitation training (will be scheduled if requests are sufficient).

In radiological health training, the basic course, which stresses basic radiation physics and survey techniques, will be presented:

Oct. 5-16, 1953	January 11-22, 1954	May 3-14, 1954
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The intermediate course, emphasizing laboratory assay of radio elements and X-ray survey techniques, will be given:

Oct. 19-30, 1953	Jan. 25-Feb. 5, 1954	May 17-28, 1954
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An advanced course for professional personnel concerned in particular with occupational health problems will be presented:

Feb. 8-19, 1954

The date of a short course for water works personnel will be announced later.

A bulletin describing the courses and giving further details is available upon request from the Officer in Charge, Environmental Health Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Cincinnati, Ohio.

Rat-Resistant Construction Materials

In a study to determine the resistance of construction materials to penetration by rats, panels of construction materials, including aluminum, were exposed to gnawing by wild roof rats. In specially designed cages, single sheets of test materials were used as barriers between the rats and food and water. The rats, kept on reduced rations, attacked the panels in an effort to reach the bait.

The study showed that rats require a gnawing edge to make any appreciable progress in penetrating materials. They can develop such an edge on soft materials, but with harder materials they require a construction joint or a fracture as a point of attack. All but a few test materials were penetrated when a gnawing edge was exposed.

Without gnawing edges, some materials were penetrated in 1 to 8 nights. Others were penetrated in about the same length of time, but required a gnawing edge. Some of the harder materials and heavier-gauge aluminum alloys required 34 to 126 nights' exposure with a gnawing edge. The hardest grades of asbestos cement and metal base plates of sheet iron withstood up to 122 nights of exposure without penetration or serious damage.

It was concluded that none of the materials, by themselves, were absolutely ratproof, but that composition building materials in the harder grades of asbestos cement products could be made relatively ratproof by protecting construction joints or other raw edges and by protecting the material itself in easily accessible areas.

Aluminum alloys were quite easily penetrated except for the harder tempers in the thicker sheets. Aluminum sheet material used as construction facing should be protected at all raw edges, preferably by sheet iron. Although aluminum alloys shaped as door channels with-



Public Health

MONOGRAPH

No. 11

The accompanying summary covers the principal findings presented in Public Health Monograph No. 11, published concurrently with this issue of Public Health Reports. The authors are members of the staffs of the Communicable Disease Center and the Division of Water Pollution Control (Southeast Drainage Basin), Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Tarzwell, C. M., Stenborg, R. L., Nicholson, H. P., and Lynn, W. D.: *The resistance of construction materials to penetration by rats.* Public Health Monograph No. 11 (Public Health Service Publication No. 277). U. S. Government Printing Office, Washington, 1953. Price 20 cents.

stood gnawing exposure considerably longer than the same alloys exposed as plain sheets, they are not considered suitable replacements for galvanized sheet iron as protective door channels.

Federal Care and Treatment Of Insane Prisoners

The power of the Federal Government to provide for the detention and care of "insane" persons in its custody was narrowly construed in a recent opinion of the Court of Appeals for the 10th Circuit—*Wells v. Attorney General*, 201 Fed. (2) 556 (1953).

The Court held that the Congress has power to provide proper care and treatment for persons who become temporarily insane while in the custody of the United States awaiting trial on criminal charges, and for Federal prisoners who become mentally incompetent during the term of their imprisonment after conviction. However, the Court also held that the Federal Government has neither constitutional nor inherent power to enter the general field of lunacy and to assume to act as *parens patriae* for the permanently insane. Section 4246 of the Federal Code of Criminal Procedures was accordingly interpreted as applying only to the temporarily insane.

Accused of a Federal offense, the petitioner in the case had been found to be mentally incompetent after a period of observation at the Medical Center for Federal Prisoners, Springfield, Mo. Pursuant to statute, he was com-

mitted to the custody of the United States Attorney General until he should become mentally competent to stand trial or until the charge against him should be disposed of according to law. While in jail awaiting transfer to an institution, he petitioned for a writ of habeas corpus challenging the validity of his commitment. The District Court denied his petition. The Court of Appeals remanded the case with directions for a hearing and finding as to whether the petitioner's mental incompetency was temporary or permanent.

A dissenting opinion in the case took the view that once the Federal Government has acquired jurisdiction over mental incompetents, as in an arrest for or conviction of a Federal offense, its duty is to protect and care for them whether they are temporarily or permanently incompetent; also that the manner in which the duty is to be discharged is to be determined by the Federal Government.

This note has been prepared by the Public Health Division, Office of the General Counsel, Department of Health, Education, and Welfare.

Public Health Service Publications Issued During 1952

A listing of all Public Health Service publications released during the calendar year 1952 is now available upon request to the Public Inquiries Branch, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C. Entries are classified by general subject matter. Periodicals issued during the year are also listed.

Health of Workers in Chromate Producing Industry

Public Health Service Publication No. 192. 1953. 131 pages; tables, charts. 50 cents.

An investigation made by the Public Health Service relating to the incidence of carcinoma among workers in chromate production substantiates this problem. The detailed report of findings includes the origin of the study, which was requested by the chromate industry, an abstract-summary, discussion and recommendations, and an appendix giving chemical analyses methods of air-borne particulate materials.

Factors which might influence the abnormally high rate of bronchiogenic cancer among these workers are reported in the correlation of clinical and environmental findings. Other derivatives of chromite ore than those incriminated by previous investigators are considered.

Recommendations are that established industrial hygiene engineering principles be applied to all chromate plants; that workers in the chromate industry for 5 or more years be examined by X-ray every 3 months and have followup clinical examinations by local health departments; and that the morbidity and mortality experience studies among chromate workers be continued.

Public Sewage Treatment Plant Construction, 1952

Public Health Service Publication No. 291. 1953. 18 pages; tables.

The Nation's progress in reducing the pollution of its water resources through construction of municipal sewage treatment plants is summarized in this report, which reveals that a total of 515 communities in the United States awarded contracts for this type of construction in 1952. The total expenditure involved, \$137 million, is less than that expended

for any year since 1948 and falls short of the long-term average of \$141 million for the period 1915-50.

In addition to this information the report contains tables showing contract awards by drainage basin, population served, type of construction, and cost. Data are given on present and estimated future water use, and population and industrial growth. The tables also show contract awards by amount spent for the years 1948 to 1952 and the expenditures for various types of public utility construction are compared.

The accompanying text discusses the data in terms of the importance of pollution control for health and economic reasons and explains why communities are lagging in municipal sewage-treatment plant construction. A complete list of the 1952 contract awards is given in the appendix.

The Dietitian in the Hospitals of the Public Health Service

Public Health Service Publication No. 254. 1953. 26 pages; illustrated. 15 cents.

One of several publications on careers in the Public Health Service, this small booklet describes the duties and responsibilities of the dietitian in Public Health Service hospitals.

It points out that in addition to supplying the nutritional needs of the patients, the dietitian serves as a member of the professional medical team, working closely with the physicians and dentists on research projects and on special studies and experiments with patients requiring therapeutic diet treatment.

The booklet describes the work of the hospital dietary service. The commissioned corps system is explained and the qualifications and requirements for appointment in the corps are covered, as are salary, quarters, and other benefits.

Venereal Disease Clinic Directory

Public Health Service Publication No. 257. Revised 1952. 148 pages. 60 cents.

This directory is published biennially by the Public Health Service's Division of Venereal Disease to provide the latest information on clinics and other facilities available for the diagnosis and treatment of the venereal diseases.

The material included in the recently published 1952 edition has been compiled from information supplied near the end of the calendar year by health departments of the 48 States; the Territories of Alaska, Hawaii, Puerto Rico, and the Virgin Islands; and by the Division of Hospitals of the Public Health Service. The names and addresses of each diagnostic and treatment facility, the days and hours of service, as well as the fee basis for use of each facility are listed.

Summaries of premarital and prenatal laws as they pertain to venereal disease are given for each State and Territory having such laws. In addition, laboratory facilities available in each State are described.

According to the directory, 39 States and 2 Territories have premarital laws requiring blood tests and physical examinations for venereal disease; 42 States and 3 Territories have prenatal laws requiring blood tests for the pregnant woman.

Biological Products

Establishments Licensed for the Preparation and Sale of Viruses, Serums, Toxins and Analogous Products, and the Trivalent Organic Arsenic Compounds.

Public Health Service Publication No. 50. Revised December 1, 1952. 1953. 46 pages. 20 cents.

In accordance with section 351 of the Public Health Service Act regulating the sale of viruses, serums, toxins, or analogous products or arsphenamine in the District of Columbia and in interstate traffic, the

Public Health Service licenses establishments manufacturing these products in the United States and abroad. The granting of a license means that the establishment is inspected regularly as to the technical ability of the responsible personnel and as to sanitary conditions of the premises. It means that the products are manufactured under methods considered to be safe and that the finished product is tested as to safety and purity and compliance with official standards of potency.

This publication lists all establishments holding licenses and the names of the products for which they are licensed. Part II is a list of the various biological products with the license numbers of the establishments producing them, and part III is an alphabetic listing of the manufacturers.

Management of Chancroid, Granuloma Inguinale, and Lymphogranuloma Venereum

Public Health Service Publication No. 255. Revised 1953. By Robert B. Greenblatt. 66 pages; illustrated. 30 cents.

This is the second edition of the publication issued in 1943 as Supplement No. 19 to the *Journal of Venereal Disease Information*. It has been completely rewritten and revised to include the latest methods used in the management of chancroid, granuloma inguinale, and lymphogranuloma venereum since the advent of the antibiotic drugs.

The booklet describes in detail the etiology, incubation period, epidemiology, clinical signs and symptoms, clinical course, diagnosis, and treatment of these venereal diseases. Tables carry information on incidence of the diseases, as well as data on the comparative efficacy of various therapeutic methods. A special section is concerned with differential diagnosis. The bibliography is extensive and offers a comprehensive survey of the literature on the venereal diseases with which it is concerned.

Written by Dr. Greenblatt, an outstanding authority, in collaboration with several of his colleagues, this book is considered a medical reference work on chancroid, granuloma inguinale, and lymphogranuloma venereum.

Clean Water for the South

Public Health Service Publication No. 250. 1953. 6 pages; illustrated. 5 cents.

Clean Water for the Tennessee

Public Health Service Publication No. 271. 1953. 6 pages; illustrated. 5 cents.

Based on the Summary Reports on Water Pollution for the Southeast Drainage Basin and the Tennessee

River Drainage Basin, these publications are two of a series of brief discussions of the 15 technical reports on the water pollution problem in the United States.

Written in nontechnical language and planned with the State pollution control agencies as a stimulus for local action, the leaflets outline in digest form the specific pollution problems in the Southeast Drainage Basin and Tennessee River areas.

The extent of pollution damage as it affects health, industry, and recreation in each section is discussed, and the areas' and communities' contributions to the problem are outlined. Some of the cities which are now taking positive steps to combat water pollution are named as illustrations of present progress, and public support of local action to control one of the most serious threats to the Nation's welfare is strongly urged.

for the general public

Ulcers

Health Information Series No. 71. Public Health Service Publication No. 280. 1953. 1-fold leaflet. 5 cents; \$1.75 per 100.

This health information leaflet discusses what is known about the cause of ulcers and their course of development. The warning signs of ulcers are described, with emphasis on the necessity of prompt diagnosis and early treatment under the supervision of a physician. Various methods of treatment, such as rest, medicine, and diet, are outlined, and the reasons are given for their use.

Care of the Eyes

Health Information Series No. 64. Public Health Service Publication No. 113. Reprinted 1953. 1-fold leaflet. 5 cents; \$1.75 per 100.

In spite of the defense nature has provided to protect the eyes, they can still be damaged by neglect and abuse. This health information

leaflet explains that good care of the eyes begins with infants, through the protection of their eyes from bright lights and the dangers of pointed objects. School-age children should be taught good reading habits and people of all ages should practice cleanliness in the care of their eyes.

The leaflet also advises regular eye examinations by an eye specialist and explains the difference between the oculist or ophthalmologist, optometrist, and optician.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.



Recruitment Plan

MICHIGAN. Believing that rewarding careers in the field of health, less well known than medicine, dentistry, pharmacy, or nursing, may be overlooked by parents and teachers in counseling students of junior and high school age, professional groups are cooperating in a new recruitment plan.

The Medical Society, the Michigan Health Council, the Hospital Association, and the nursing profession have joined forces in the State to present the advantages of a career as an assistant, or associate, in one of the numerous medical service professions where shortages exist or where shortages are anticipated.

To coincide with the observance of Michigan Hospital Week, the bulletin of the health council announced that the findings of a recent survey of these professions revealed 960 medical service positions then open in the State. The bulletin named the vocational categories where immediate placement could be made. The survey, made by the Michigan Hospital Association, concluded that in 5 years, even if present needs were met, there still would be 1,890 openings for dietitians, laboratory technicians, medical record librarians, and X-ray technicians, among others.

The wide range of opportunities available in the expanding health and medical associate professions are highlighted in a brochure on career planning prepared by the Michigan State Medical Society.

Together with descriptive text and action photographs, the booklet features a comprehensive chart which outlines each of 26 vocations. The vocational outlines include educational requirements, Michigan schools offering instruction, and information sources outside the State, employment conditions, salary ranges, and opportunities for advancement and security.

Regional Legislative Conferences

FLORIDA. Six regional legislative conferences have been held to acquaint State legislators and community groups with the legislative goals of public health agencies. To assure the greatest coverage, the conferences were held in six key cities. Brief descriptions of proposed health legislation and appropriation requests and a listing of legislation in which the various health organizations had especial interest were distributed.

The conferences were guided by the Florida Public Health Association: Its executive committee provided the necessary funds; its legislative committee made the plans. Tentative dates were set in advance. Community leaders were selected as local regional chairmen in each key city.

A copy of the agenda and a list of the participating groups were sent by letter to all county health officers 2 months before the first meeting. The purpose of the conferences was explained, and the proposed dates, the names of the regional chairmen, and the counties included in each of the six regional areas were given. Each health officer was requested to act as conference coordinator for his county and to suggest the names of leading citizens to be invited to

attend. Other notices were sent to all State legislators and to various individuals and groups.

General news stories describing the conference plans were sent to all newspapers in the State 2 weeks before the first meeting. Regional news stories were sent to the papers in the regional area 1 week ahead of each regional conference. These stories quoted the regional chairmen on the importance of the meeting and repeated the time, place, location, and purpose. Two days before the regional meeting, local news stories with local names and local plans were sent to the county health officers for release in the counties within the regional area. Copies of all stories were sent to radio stations in each region, and news commentators were asked to use the information for local broadcasts.

Presenting their program goals before the regional legislative conferences were representative official and voluntary State groups concerned with public health problems. Among these, in addition to the Florida Public Health Association, were the Florida State Board of Health, the Mental Hygiene Association, the State division of the American Cancer Society, the Florida Tuberculosis and Health Association, the Anti-Mosquito Control Association, the Tuberculosis Board, the Children's Commission, the Hospital Association, and the division of vocational rehabilitation of the Department of Education.

Legislators, official and voluntary agencies, and civic groups were well represented. The estimated total attendance at the 6 regional sessions was 900 including 49 members of the Florida legislature. By the questions they asked, members of the audiences demonstrated their real interest in the public health programs and the proposed legislation.

A black and white outline map of the Americas, showing the continents of North and South America. The map is positioned on the left side of the page, with the title text to its right.

Servicio

Ten Years of Operation

of the

Bilateral Health Programs

of the

Institute of Inter-American Affairs

Excerpts from an evaluation survey
by the Public Health Service, 1953

PUBLIC LAW 369 of the 80th Congress provided that the purposes of the Institute of Inter-American Affairs "are to further the general welfare of, and to strengthen friendship and understanding among, the peoples of the American Republics through collaboration with other governments . . . in planning, initiating, assisting, financing, administering, and executing technical programs and projects, especially in the fields of public health, sanitation, agriculture, and education."

This Congressional enactment in itself recognized the contributions to hemispheric security and well-being which had come from the Institute's activities since its creation in 1942 as a corporate entity under authority granted to the then Coordinator of Inter-

American Affairs. During 1952, following upon a suggestion first advanced in 1950 by the Institute, the Public Health Service undertook to evaluate the bilateral health programs which had been developed with our good neighbors during the previous decade.

Public Health Reports publishes in this and succeeding issues excerpts from the findings and conclusions of this survey. The portions have been selected as being of major interest to professional persons in the fields of public health in three respects: first, for their intrinsic factual value as a report of an international technical assistance program; second, as a "case report" of a technical field evaluation of public health practice; and, as a review of current concepts of public health administration.

. . . from the Surgeon General's

FOREWORD

The fifth decade of this century witnessed some extraordinary advances in international collaboration in the field of public health. Although these advances were partly due to the urgencies of World War II, they have continued into this decade. There is reason to think that, when the history of these troubled times is finally written, the careful historian will see in the emergence of the cooperative health programs in Latin America a significant development in the Western Hemisphere's search for higher levels of health and stability.

The translation of an underlying cooperative spirit into effective action through a joint administrative device, the *Servicio*, marks a significant experiment in international cooperation in health. A will to work together has been coupled with a way to work together in the family of nations.

Servicio Principle

The *Servicio*, as an administrative device, has stood out as one of the special and characteristic features of the Institute of Inter-American Affairs program. The president of the Institute in 1951 described *Servicio* as:

" . . . the generic name of the administrative device through which the Institute works with the other American Republics in the execution of technical assistance or basic economic development programs. The Spanish word "*Servicio*" means service; it is also the synonym for Government bureaus in the United States. A cooperative *Servicio* is a bureau or department of a ministry of a Latin American government, such as the Ministry of Agriculture, Public Health, or Education. . . .

"Although a *Servicio* is part of a ministry, it is autonomous in many respects. Its autonomy is derived from the authority vested in the director to determine, with the concurrence of the minister, the administrative procedure to be followed by the *Servicio*. . . . The Latin American Republic is represented by the minister of the cooperating ministry, and the Institute of Inter-American Affairs is represented by the chief of field party. The Insti-

tute sends to the American Republic such technicians as are required and names as the head of the group a chief of field party. The minister and the chief of field party are co-equals in developing the administrative techniques to be followed by the *Servicio*."

The Task of Evaluation

To characterize the *Servicio* is one thing. To attempt to trace and evaluate the operation of the *Servicio* in all its multiphasic detail and significance is quite another.

The Public Health Service's report represents an initial step toward tracing and evaluating the operation of the *Servicio* in inter-American cooperative agreements. The study is the first of its kind, and is, therefore, unique. It was a shared project in which the chiefs of field party and the specialists of the evaluation team worked together in the field and later around a conference table in Washington. Their aim throughout, through the process of give and take in frank discussion, was to reach a consensus on the final report. Although time limitations prevented gathering the ideal amount of survey data, the report as a whole gives a picture of the program and sets out some guideposts. Incomplete as the study may be, it can serve as a springboard for further accomplishment in international cooperation for the advancement of health.

LEONARD A. SCHEELE, M.D.

. . . from the IIAA President's INTRODUCTION

During the decade 1942-52 many factors gave impetus to the widespread development of public health throughout the Americas. In light of the importance of public health promotion on a worldwide basis, it seemed important to make some estimate of the values inherent in the joint programs of the Institute of Inter-American Affairs, and to determine somehow, if at all possible, the particular merits of the techniques used and the value and effectiveness of programs focused, as these were, at certain defined areas of health development. It was considered necessary that the facts at least be placed in the open for others to study.

With these ends in view, the Institute determined upon an evaluation of its accomplishments in health, yes, and its failures. It wished this to be as objective as possible. It therefore suggested to the Public Health Service, which has had wide and varied experience in evaluating programs within the United States, that it undertake this task. The Public Health Service agreed to attempt the job and has produced a report unique in character and charged with solid values. The evaluation has been not a dead analysis, but a creative assessment, a guide for the future.

That such an undertaking was impossible of accomplishment on any quantitative, traditional, statistical basis was evident from the fact that the basic data concerning the underlying problems and the progress made toward their solution were lacking. This lack is indeed one of the outstanding problems in Latin America even today. It is one to which too little attention has been paid during the course of the years in the international programs. Further to complicate the problem, the Institute itself did not have basic data with which to measure truly the effect of its individual projects and their impact upon communities. The program from the beginning was an action program which under the exigencies and pressures of war did not allow for the basic studies and the establishment of measuring rods which were known to be desirable. Under war conditions, the indispensable was dispensed with.

The impact upon crude health problems which could be easily seen by the untrained eye could not be measured to the full satisfaction of the technically trained. Many thousands throughout the hemisphere feel, live, and know the deep and truly great values of this program. Recognizing that a cold routine analysis could not be made, it remained, therefore, to determine how an estimate of the accomplishments of the program could be arrived at with the greatest objectivity. It was apparent both to the Public Health Service and to the Institute that an evaluation of the accomplishments of the program would have to be limited to a comparatively quick but nonetheless expert "look-see," one which, while not exhaustive, would carry authority in the world of public health.

C. O. ROWE, Acting President.

The Evaluation Survey

The survey was a joint undertaking of the Public Health Service and the Institute of Inter-American Affairs. Representing the Service until his death in April 1952 was Joseph W. Mountin, M.D., chief of the Bureau of State Services. He was succeeded by J. O. Dean, M.D., associate chief of the Bureau of State Services. Representing the Institute was Henry Van Zile Hyde, M. D., then director of the Division of Health and Sanitation, Institute of Inter-American Affairs, now chief of the Division of International Health, Public Health Service.

The Evaluation Team

Wilton L. Halverson, M.D., director, California Department of Public Health (team director).

John J. Bourke, M.D., executive director of the New York State Joint Hospital Survey and Planning Commission.

Earl V. Bradsher, director of Welfare Administration for New York City and formerly a staff member of the Public Administration Service.

Edna F. Brandt, assistant chief nurse, Division of Chronic Disease and Tuberculosis, Public Health Service.

Mayhew Derryberry, Ph.D., chief of the Division of Public Health Education, Public Health Service.

George M. Foster, Ph.D., visiting professor of anthropology, University of California, and formerly director of the Institute of Social Anthropology, Smithsonian Institution.

Richard F. Poston, officer in charge of Western Gulf and Colorado Drainage Basins Office for Stream Pollution Control, Public Health Service.

George K. Strode, M.D., formerly director of the Division of International Health, Rockefeller Foundation.

The evaluation team was assisted by A. Joan Klebba of the Institute of Inter-American Affairs and Howard Wheeler of the Public Health Service, who contributed to the development of historical data and made extended search and analysis of file material.

Genesis and General Structure

ACTUAL LAUNCHING of the cooperative health program of the Institute of Inter-American Affairs may be said to have occurred with the activation of its first bilateral agreement, that consummated with Ecuador in February 1942.

This inauguration of the program was in effect a projection of one of the decisions reached in the Third Meeting of Ministers of Foreign Affairs of the 21 American Republics, held in Rio de Janeiro in January of the same year. In a resolution unanimously approved, the foreign ministers had recommended the use of the bilateral health agreement as an important instrument for furthering the security and prosperity of the nations of the hemisphere.

Early Activities

Convened against the backdrop of World War II, the Rio de Janeiro conference stands out chiefly by reason of its achievements in line with a mounting concern for a solid hemisphere front in the face of the Axis threat. But, less conspicuously, it was expressive also of a movement which stretched much further back: a slow and more or less sporadic advance in international cooperation in the Western Hemisphere, the beginnings of which had first become apparent in bilateral conventions for control of pestilential epidemics in the first half of the 19th century.

In the wake of these conventions, as the century was drawing to a close, had come the Committee on Sanitary Regulations, created by the First International Conference of American States, in Washington, D. C., in 1889-90. The first half of the 20th century had witnessed the emergence of the world's first international health organization, the Pan American Sanitary

Bureau, in 1902; a series of 12 Pan American Sanitary Conferences, beginning in the same year; the signing of the Pan American Sanitary Code of 1924, a provision of which made the Pan American Sanitary Bureau the central coordinating health agency of the 21 subscribing states; and a series of 6 Pan American Conferences of National Directors of Public Health, arranged by the Sanitary Bureau.

The hopes and plans of the farsighted in the field of public health were further translated into concrete measures when the foreign ministers met in Rio de Janeiro at the beginning of 1942. It could have been that the urgencies of defense accelerated an already definite movement. At any rate, the bilateral health agreement was recognized and recommended as a means for closer ties and more effective inter-American cooperation.

In the United States, Nelson A. Rockefeller had long been an outstanding figure in the field of inter-American relations. Even before the Second Meeting of Ministers of Foreign Affairs in Havana, in July 1940, he had sponsored a memorandum to President Franklin D. Roosevelt entitled "Hemisphere Economic Policy." This memorandum was to result in the creation of the Office of the Coordinator of Inter-American Affairs, under which the Institute was later to be established.

Mr. Rockefeller had intimate knowledge of the activities of the international health division of the Rockefeller Foundation. A few years after its establishment in 1913, the Foundation had begun promoting public health, the medical sciences, and the natural sciences in a number of the Latin American republics. Methods employed had included the giving of fellowships, grants-in-aid, and scholarship

grants, and the establishment of special services within the structure of host governments.

The Foundation had placed particular emphasis on the training of nationals in public health and allied fields. Many Latin Americans trained with its aid had risen to influential posts in the health organizations of their countries. They were available to help in forming the nuclei of trained personnel if and when a program of cooperation through bilateral agreements between the United States and its neighbor nations should be launched.

Out of Mr. Rockefeller's experience and firsthand observation, therefore, had come appreciation of the importance of health programs in efforts to attain higher economic levels in the countries of Latin America.

With Pearl Harbor and the subsequent inauguration of the first bilateral program, health in its relation to supply of vital war materials became a matter of immediate and grave concern in measures for defense of the Western Hemisphere. When the Institute became a corporate actuality in March 1942, bilateral health promotion was placed high on the list of major programs.

New Departure

The inauguration in 1942 of the bilateral health programs of the Institute of Inter-American Affairs marked an entirely new departure in United States foreign policy implementation. While evaluation must take into account the emergency conditions under which the programs were launched, it must also consider a purpose extending beyond solution of pressing war-created problems. The record clearly indicates a long-range objective, the attainment of which would mean inter-American cooperation as a permanent contribution to global equilibrium.

The Mechanism

Planning of the bilateral programs had been from the premise that the administrative mechanism of the existing multilateral, national, or private philanthropic organizations could not be adjusted to take care of the new foreign political-technical work seen as necessary for the solution of critical economic, food, and health problems identified as obstacles in

the way of attainment of either the immediate or long-range goals. Although the activities of the inter-American system, both governmental and private, had prepared the way for the new programs, it became apparent that a new governmental device would be necessary. Out of this need the program took form.

The mechanism devised had two major parts:

1. A corporation of the United States Government to be known as the Institute of Inter-American Affairs.

2. A unit in one of the ministries of the host government, generally called the *Servicio*, to plan and carry out the projects which would constitute the program in the host country.

These two parts of the mechanism were put and held together by the first interchange of diplomatic notes on the subject of the cooperative program, and by subsequent instruments known as basic agreements between the representative of the Institute and the minister or other designated officer of the cooperating host government.

In the early planning for the health programs, Mr. Rockefeller had made the decision that the administration of health activities should not be carried out directly by the Coordinator of Inter-American Affairs but by a subsidiary corporation. This decision was based in large part on the experience of the international health division of the Rockefeller Foundation, whose years of work had demonstrated the value of placing foreign programs on as flexible a basis as possible without loss of essential administrative control.

The Bilateral Agreements

The Institute's programs were activated from the beginning by agreements entered into with governments of the neighbor nations. After a decision was reached, in consultation with the Department of State, that the establishment of bilateral work was desirable in a given Latin American country, this fact was communicated to the United States Ambassador to that country. After a preliminary authority was given to establish bilateral work, the final authority was usually established through exchange of diplomatic notes between the United States Ambassador and the government of the country selected. This was generally followed by

so-called basic agreements made between the representative of the Institute and the minister of health or a designated officer of an appropriate ministry in the host government. Agreements were in most instances for specific periods of time. At the beginning, 2 or 3 years were usually specified. During the postwar letdown, agreements for only 1 year were made. After 1950, the term was usually 5 years, with funds committed for only 1-year periods.

The Servicio

Under the agreements, both parties provided contributions "in accordance with availability of raw materials, services, and funds," and usually agreed to the establishment of a *Servicio* in the host government.

Before the end of 1942, Dr. George C. Dunham, the first director of the bilateral health work, had supervised the successful establishment of programs in 11 countries. In order of establishment, they were: Ecuador, Haiti, Paraguay, Costa Rica, Nicaragua, Honduras, El Salvador, Peru, Brazil, Guatemala, and Bolivia. In 1943, programs were established in 7 more: Colombia, Panama, Venezuela, Chile, Mexico, Dominican Republic, and Uruguay.

Because of limitation of funds, the programs in Nicaragua, Costa Rica, and the Dominican Republic were terminated in the middle of 1947. The program in Panama was terminated in September 1945. All these programs, except that of the Dominican Republic, were reopened early in 1951.

Table 1. Number and estimated cost of special¹ and cooperative health and environmental sanitation projects in Latin America through June 30, 1951, by class of project

Class of projects	Number	Estimated cost
All projects.....	1, 665	\$103, 015, 915. 56
Special projects ¹	² 125	3, 382, 965. 00
Cooperative projects.....	1, 540	99, 632, 950. 56

¹ Special projects include all projects that were financed directly by the Institute of Inter-American Affairs. These projects did not constitute a part of the country programs that were financed and executed by the *Servicios* in the host countries.

² An approximation based on numbering system used for special projects.

Table 2. Number and estimated cost of cooperative health and environmental sanitation projects in Latin America through June 30, 1951, by country

Country	Number	Estimated cost of projects
All countries.....	1, 540	\$99, 632, 950. 56
Bolivia.....	105	4, 802, 122. 52
Brazil.....	349	26, 391, 059. 19
Chile.....	44	9, 082, 780. 21
Colombia.....	75	8, 961, 382. 04
Costa Rica.....	43	1, 038, 147. 54
Dominican Republic.....	24	571, 436. 34
Ecuador.....	138	6, 860, 722. 44
El Salvador.....	127	3, 005, 913. 45
Guatemala.....	38	6, 195, 365. 54
Haiti.....	89	2, 414, 260. 86
Honduras.....	69	2, 958, 580. 86
Mexico.....	125	8, 366, 374. 38
Nicaragua.....	68	1, 029, 254. 01
Panama.....	29	684, 608. 97
Paraguay.....	39	2, 987, 762. 12
Peru.....	50	5, 872, 413. 00
Uruguay.....	31	1, 415, 517. 47
Venezuela.....	97	7, 025, 249. 13

The agreements usually provided that the Institute would send to the cooperating country a small "field party" of professional and technical personnel, including usually a physician, engineer, and nurse. It was also usually provided that the chief of this field party would not only represent the Institute, but would also be the director of the *Servicio* in the host government, subordinate to the minister or other designated officer in the cooperating ministry.

Under the agreements, all work undertaken was to be broken down into projects, and before these were started a project agreement was to be signed by both the chief of the field party as representative of the Institute and by the designated officer of the local cooperating ministry. This arrangement was to encourage joint planning as well as joint financing and execution of all work undertaken.

Personnel Ratios

Servicios were staffed primarily by nationals of the countries with which the Institute was cooperating. The purpose was not only the utilization of nationals, but, through inservice training, to give national professional personnel necessary experience in the maintenance and operation of the projects, all of which by agree-

ment were to be turned over in time to the host country.

As early as February 23, 1943, the estimated ratio of United States to host country technicians in the field programs was 1:25. By the middle of 1945 there were employed 223 United States citizens (including 30 physicians, 52 engineers, 11 architects, and 36 nurses) and 12,278 national personnel (including 356 physicians, 135 engineers, 172 registered nurses, 1,495 other technical and clerical personnel, 1,202 practical nurses or sanitary inspectors, and 8,918 workmen)—a ratio of 1:55.

During the war years most of the United States physicians and sanitary engineers were assigned from the Office of the Surgeon General of the Army. As of June 1952, the number of Latin Americans working on the health programs totaled 7,134 and the number of United States personnel in the field parties and the technical pool, 119—a ratio of 1:60. Included were 462 Latin American and 15 United States physicians and dentists; 298 Latin American and 20 United States graduate nurses; 94 Latin American and 26 United States sanitary engineers; 59 Latin American and 11 United States civil and other engineers;

and 40 Latin American and 4 United States health educators.

Program Supervision

The chief of the field party was given very broad authority to carry out the program in terms of projects worked out with the minister of the host country or his designated officer. This was in pursuance of a policy of decentralization and development of local field programs under a system by which all projects for a country would be determined locally by joint agreement.

One of the advantages seen in this policy was that it would operate to allay the expressed fears of "invasion of sovereignty." Some general policy lines were kept in view even in the earliest days, however, by the frequent visits paid to the *Servicios* by Dr. Dunham and other staff members. In 1948 a "technical pool," of always less than 10 persons, was created as an additional arm of the Washington office. The president of the Institute and his immediate staff also made field trips for evaluation of accomplishments. Through analysis of required periodic field reports and of project and completion

Table 3. Number and estimated cost of health and environmental projects carried out by the co-operating host countries in Latin America and the Institute of Inter-American Affairs through June 30, 1951, by category of project

Category of project	Number	Estimated cost of projects	Category of project	Number	Estimated cost of projects
Total.....	1, 540	\$99, 632, 950. 56	Environmental sanitation (water supplies, sewage disposal facilities, markets, slaughterhouses, etc.).....	494	\$21, 014, 845. 10
Administration, rent, and equipment of <i>Servicios</i>	134	18, 332, 724. 40	Health education.....	19	789, 307. 35
Projects to strengthen directly indigenous national and local health services (administration buildings, laboratories, equipment, technical assistance, etc.).....	66	3, 398, 922. 07	Industrial hygiene surveys and studies.....	2	294, 105. 93
Training facilities and training programs.....	118	4, 648, 556. 81	Nutrition (construction, equipment, and operation).....	6	458, 461. 23
Hospitals, health centers, and other medical facilities and services (construction and operation).....	431	36, 744, 967. 57	Public health statistics.....	1	566. 21
Special disease control (including malaria control by drainage).....	220	12, 161, 739. 54	Special medical research.....	2	6, 287. 07
Medical care programs for highway workers, rubber workers, etc.....	31	974, 507. 24	Social welfare (construction of buildings, playgrounds).....	7	90, 349. 89
			School health program.....	1	5, 723. 18
			Miscellaneous (including matching projects undertaken by Venezuelan Government).....	8	711, 886. 97

Table 4. Program funds available to the 18 Servicios in Latin America for cooperative projects from the beginning of the programs until June 30, 1951

Country	Total	Contributed by the host countries ¹	Contributed by Institute of Inter-American Affairs
All countries.....	\$107, 050, 606. 01	\$67, 316, 421. 24	\$39, 734, 184. 77
Bolivia.....	4, 852, 112. 52	2, 967, 112. 52	1, 885, 000. 00
Brazil.....	31, 357, 520. 55	22, 692, 520. 55	8, 665, 000. 00
Chile.....	9, 208, 430. 05	3, 808, 430. 05	5, 400, 000. 00
Colombia.....	9, 580, 396. 22	7, 472, 395. 42	2, 108, 000. 80
Costa Rica.....	1, 199, 257. 86	359, 382. 86	839, 875. 00
Dominican Republic.....	575, 000. 00	175, 000. 00	400, 000. 00
Ecuador.....	7, 074, 431. 08	3, 547, 931. 08	3, 526, 500. 00
El Salvador.....	3, 115, 504. 84	2, 150, 504. 84	965, 000. 00
Guatemala.....	6, 196, 732. 63	5, 146, 732. 63	1, 050, 000. 00
Haiti.....	2, 475, 521. 16	1, 387, 521. 16	1, 088, 000. 00
Honduras.....	2, 989, 710. 72	2, 014, 710. 72	975, 000. 00
Mexico.....	8, 591, 081. 50	3, 391, 081. 50	5, 200, 000. 00
Nicaragua.....	1, 119, 582. 37	269, 582. 37	850, 000. 00
Panama.....	736, 808. 97	175, 000. 00	561, 808. 97
Paraguay.....	3, 026, 366. 81	1, 376, 366. 81	1, 650, 000. 00
Peru.....	5, 936, 170. 66	3, 691, 170. 66	2, 245, 000. 00
Uruguay.....	1, 727, 298. 76	1, 002, 298. 76	725, 000. 00
Venezuela.....	7, 288, 679. 31	5, 688, 679. 31	1, 600, 000. 00

¹ Includes financial contributions by State and local governments and philanthropists in host countries, but does not include \$6,552,171.01 contributed by host government in other than cash (buildings, land, etc.).

agreements on every unit of work undertaken, additional supervision and evaluation of operations were provided for.

Funds

From the creation of the corporation in March 1942, the United States Government financed its role in the bilateral health work by allocation of funds to the Institute. The estimated costs of projects, the amounts of disbursements by the Institute, and the contributions by host governments, from the beginning of the programs through June 30, 1951, are shown in tables 1-4.

The flow of program funds was determined, in the first instance, by the basic and, secondly, by the individual project agreements signed by

both the representative of the Institute and the minister of health or other designated officer of the host government.

Although the total figures give some indication of the project patterns in all of the countries, there was considerable variation from country to country. Projects in Ecuador, for example, were primarily in hospital construction in the early part of the program, and later were primarily to augment water supply. Panama's first program was almost exclusively malaria control. During the first year, construction of water supplies was emphasized in Mexico, but later a wide program including health center organization and construction was developed. The reasons for these shifts in emphasis also varied from country to country.



Assessment Viewpoints and Procedures

Problem: How to judge the effectiveness of technical programs in health and sanitation undertaken during a decade of social, economic, and political complexities. The following is a résumé of criteria and methods used in calculating the values of the bilateral efforts of the Western Hemisphere to help good neighbors help themselves.

TWO BROAD AREAS of analysis lay within the problem of evaluating the *Servicio* effort. They were:

Analysis of the health activities sponsored by the cooperating Latin American countries and the Institute of Inter-American Affairs, with special reference to their role in raising standards of living.

Analysis of the Servicio as an administrative mechanism and of its principal operational techniques, with special reference to its role in strengthening indigenous health services.

The overall question to be answered in the first area was: How well did the health activities sponsored by the Institute assist host countries to make the best use of existing health improvement resources, and how soundly planned was the addition of new health resources?

The second area called not only for the collection of information on the variations in the patterns of the *Servicio* and the operational techniques used, but also for analysis of these devices both in relation to their adequacy in carrying out the individual projects and as forces in strengthening and increasing health improvement resources in the host countries.

In any broad judgment of the performance of the men and women whose responsibility was the planning and execution of programs, three factors would have to be considered:

1. No blueprint based on experience existed for the systematic development of health

service with foreign financial and technical assistance.

2. The selection of projects was a cooperative undertaking—the Institute and representatives of the host country sharing the responsibility.

3. There had been considerable pressure, because of the exigencies of World War II, to waste no time in getting projects under way and to obtain as obvious results as possible.

Analysis of Health Activities

For the purposes of analysis, health activities could be grouped with little overlapping as: (a) auxiliary to military projects; (b) auxiliary to individual economic projects; (c) basic health projects.

The problem of evaluating any one of the groups varied considerably from the problems of the others. But for no group was it seen to be the task of the evaluators to measure the value of health activities in relation to balanced economic development programs in the host country. In fact, in no one of the countries included in the survey was it claimed that there existed such a balanced program, with proper weighting given to advancing living conditions and increasing economic production. This is not to say that the Institute had recognized no relation of health activities to the economic systems of the host governments. To the contrary, it was part of the record that health activities, together with those in education, housing, nutrition, transportation, and irriga-

tion, had been regarded as most important for bringing about the progress that must be realized to enable economic development to take place. For a number of years a division of the Office of the Coordinator of Inter-American Affairs, which included the Institute, had been charged with the development of health and allied activities and had been designated as its "basic economy department."

Services Auxiliary to Military Projects

Little time was given to the evaluation of the health services developed in relation to military projects. These had been terminated even before the end of World War II. Of most of them, scarcely any physical vestige remained locally to bear witness to their accomplishments.

Services Auxiliary to Economic Projects

Typical of undertakings to further specific economic activities was the medical care and malaria control work in the railroad construction camps in the Rio Doce Valley in Brazil. This work helped to make possible the relocation and repair of the railroad connecting the rich iron ore region to the coast. Another example was the medical care and environmental sanitation work in the camps established in Central America in connection with work on the Pan American Highway.

The problem of the evaluators was not to weigh the cost of the overhead services in relation to increased productivity in the area, for if it should be found, for example, that development of the iron ore industry was delayed until the railroad should be reconstructed, the fault would lie with the original economic planning or other factors. The health project evaluators could concern themselves only with the technical qualities of the projects and the question of whether immediate objectives were achieved. Again, since most of these projects had long since been completed, reliance had to be placed on the written record and eye-witness testimony.

Basic Health Projects

Basic health projects constituted about 90 percent of all the health projects sponsored by

the Institute and the cooperating countries. Adequate evaluation required that they be reviewed (a) in relation to the total social development resources and needs of the area they were established to benefit; and (b) as to their technical competence and adaptation to media in which they were introduced. The steps required in the analysis were:

Survey of resources, those existing in the countries as well as the funds and technical personnel available from the Institute.

Survey of needs and assignment of priorities to most urgent needs.

Evaluation of allocation of resources to needs.

Survey of Resources

In underdeveloped countries social development resources are always fewer than social needs, just as economic development resources are always fewer than economic needs. A corollary consideration in evaluation is that social needs in underdeveloped countries are always much greater than resources. Yet resources, and not merely needs, must be the basis for judging as well as for planning social development programs.

Among the most important items of information needed in the survey of resources were: national income and its trend over the 10-year period; proportion of government budget allocated to health and medical services; revenue for health and medical activities from other than public sources; existing health and other social facilities and services; capacity and rating of training institutions for physicians, nurses, and engineers; existing professional and auxiliary medical and allied manpower; compulsory and voluntary prepayment medical care plans; private medical and hospital services; income maintenance resources; and public assistance resources.

Survey of Needs

Throughout the 10 years of operation considerably more work had been done concerning needs than concerning resources. Not only the disease situations but the behavior of the general population in relation to healthful living practices could be used as broad indicators of the most urgent needs.

Evaluation of the allocation of resources to needs was, of course, the most difficult step. The approach could not be based entirely upon the historical experience of those countries which, through several centuries, had evolved more adequate health services. The Latin American countries had not evolved organic services based on strong, long-evolving medical tradition following or paralleling economic expansion. Important health services in Latin America could not be delayed until adequately financed through successful industrialization, but had to be conceived as a necessary overhead or as a mortgage to accelerate economic expansion. Whereas in the more highly developed countries the growth of health services came about from the almost uninterfered-with operation of the law of supply and demand, many of the Latin American countries for several decades had attempted, within their limited resources, to make these services available to those unable to provide for themselves. Moreover, application of the experience of other countries to the problem in Latin America was limited by the fact that there was no broad pattern within which a blueprint could be developed.

Another positive factor limiting the application of the health services found in more highly developed areas was that Latin American countries desired to take shortcuts and make across-the-board use of the great body of technical knowledge that had become available. But, with necessary modifications, the experience of the more highly developed countries could be used for evaluating allocation of limited resources to meet great needs.

It was further recognized that weighing the allocation of resources to needs required consideration of cultural as well as fiscal and technical factors. Cultural factors must include the ways of life, the value standards, and particularly the beliefs and customs of the people with respect to health and illness. Also, the motivation of those nationals whose responsibility was the formation and execution of the health programs in the country must be understood. Without such data, obtained by the application of techniques developed by the social anthropologist and other workers in the

social sciences, it would be impossible to determine the major aids and obstacles to accomplishing the objectives of the Institute's health program.

Analysis of the *Servicio*

Building up health services in a given country with financial and technical assistance from another country immediately introduces a factor that is not present where the development is totally indigenous. This had to be taken into account in the analysis.

Although the same general pattern of operation through a *Servicio* had been recommended to all 18 host countries, in actual operation there had developed about as many patterns as there were *Servicios*. On one hand this wide variation complicated the problem of assessing the *Servicio*, but on the other it increased the experience available for testing the value of different administrative relationships of the *Servicio* to the host governments. It was necessary, therefore, to analyze the effect of the most differing patterns from the following positions: (a) relationship of the *Servicio* to the host government; (b) relationship of the field party to the *Servicio* and to other parts of the host government; (c) organizational structure of the *Servicio*; and (d) principal operational devices employed by the *Servicio* in the execution of projects.

Relationship to Host Government

Analysis of the relationship of the *Servicio* to the host government included consideration of whether the position of the *Servicio* was actually that of a unit in the host government or that of merely an intermediary agency recognized by the host government as a subsidiary office of the Institute of Inter-American Affairs.

If the *Servicio* was actually a part of the host government and not merely an intermediary agency, the relationship had to be studied still further to determine if the program of the *Servicio* was coordinated with that of the indigenous health or allied service "on paper" only, or if the *Servicio* actually did function to stimulate and strengthen the growth of the indigenous service in which it was located.

This included consideration of the relationship of the *Servicio* to the head of the ministry or division of the ministry in which it was located.

Field Party Relationships

Examination of the relationship of the North American field party included reviewing the administrative relationship not only of the chief of the field party to the representative of the host government, but of all the technical members of the field party to the nationals with whom they were associated.

It was necessary to know if these technical personnel from the United States served as project directors, heads of functional divisions in the *Servicio*, or as consultants. If they served as consultants, did they serve as consultants to nationals acting as directors of projects executed by the *Servicio* or as consultants to other professional personnel in the structure of the indigenous service? Over the 10-year period had there been changes in the administrative relationship of the North American personnel to the nationals with whom they worked?

It was also important in the evaluation to determine whether the organizational plan of the *Servicio* was primarily for the execution of projects, or whether planning and evaluation was also recognized as a necessary function.

This involved examination not only of the organization of both the *Servicio* and the field party, but also of the training and duties of the personnel.

The degree to which the *Servicio* succeeded in strengthening indigenous health services was also influenced by the operational devices employed in executing the individual projects. A possible measure of success in any given field in which continuous effort was exerted would be the rate with which change had been made from execution of projects almost entirely by the *Servicio*, with North American personnel serving as directors of projects, to execution entirely by the appropriate agency of the host government. Steps in between would include, of course, execution of projects by the *Servicio*, with nationals serving as project directors, and execution of projects by units of the indigenous health service other than the *Servicio*, with North American technicians serving as consultants.

Unless the planning and operation of projects are truly the result of teamwork between the North American field party and the host government, the activity may be, on the one hand, an almost direct service by the field party, or, on the other, a grant-in-aid or quasi-grant-in-aid from the United States to the host government.

New Foreign Operations Administration

The Foreign Operations Administration, a new agency in which are centralized foreign assistance and related economic operations formerly dispersed among several agencies, came into being on August 1, 1953, in accordance with provisions of the President's Reorganization Plan No. 7. It is responsible for the administration of the two major related assistance programs previously administered separately by the Mutual Security Agency and the Technical Cooperation Administration, as well as for the performance of other foreign aid and related economic functions formerly carried out by the Director for Mutual Security and the Secretary of State. The names "Mutual Security Agency" and "Office of the Director for Mutual Security" have been abolished.



Use of Anthropological Methods and Data In Planning and Operation

Ways of life and thought patterns of *Servicio* staff and their clientele are examined by cultural anthropologists. "Knowledge of people," they emphasize, "is as important . . . as medical science." They speak of interpersonal relations, preventive versus curative medicine, the nature of folk medicine in Latin America, and of general cultural factors, pointing to the basic place of cultural facts in planning and operating public health programs.

DEVELOPMENT of successful public health programs depends not only on the technical excellence of medical knowledge and practice, but also on the socioeconomic potential of a country and the readiness of its people to accept new ideas and habits. The economic handicaps under which public health programs in Latin America must operate are obvious; they are a function of the relatively low productivity of these countries and can be ultimately overcome only by a rising standard of living.

Other problems with which public health programs must cope may be called, for want of a better term, cultural problems. These stem in part from the great differences between the

ways of life and the thought patterns of the people toward whom *Servicio* programs are directed and the ways and patterns of the planners of such public health programs, and in part from lack of understanding of the factors which make for the most effective human relations in any given situation.

Any meaningful evaluation of the bilateral health programs of the Institute of Inter-American Affairs, therefore, presupposes an understanding of the ways of life, the value standards, and particularly the belief and customs of the Latin American people with respect to health and illness. It means, also, an appreciation of the motivations of both *Servicio* personnel and the peoples toward whom the programs are directed, and their attitudes toward each other. The following summarizes pertinent findings, analyses, and areas of agreement concerning the cultural factors affecting the bilateral health programs.

THE SCIENTIFIC APPROACH

Cultural problems cannot be solved simply by hiring friendly, understanding, well-meaning personnel. The problems must be studied and analyzed with appropriate scientific methods in much the same way a difficult biological problem is subjected to scientific examination.

George M. Foster, Ph.D., formerly director of the Institute of Social Anthropology, Smithsonian Institution, and now visiting professor of anthropology, University of California, was the evaluation team member in direct charge of this section of the report. The following members of the Institute staff carried out the special research summarized here: Charles Erasmus (Colombia and Ecuador), Isabel T. Kelly (Mexico), Kalervo Oberg (Brazil), Ozzie Simmons (Peru and Chile), George M. Foster (El Salvador and Chile). The substantial assistance of Dr. Greta Mostny in Chile is acknowledged.

Recent research in the social sciences has made available both data and techniques which make possible a more efficacious attack on these cultural problems than was possible in 1942 when the Institute of Inter-American Affairs commenced operations.

The present work was carried out by cultural anthropologists. They participated in the survey because they were the social scientists of the United States who had given the most attention to studying Latin American contemporary cultures, to finding out the ways of life in the several countries, and to analyzing the relationship of the individual to his culture. But in any long-range program of cultural analysis other social scientists, particularly sociologists and social psychologists, also should be called upon.

Speaking both from general knowledge and results of *Servicio* studies, the cultural anthropologists summarized their views in these words:

"Knowledge of the people is just as important in many aspects of a public health program as is knowledge of medical science. It is therefore recommended that, in Institute of Inter-American Affairs' program planning, provision be made for systematic research into the form and content of the cultures of each country in which work is carried out. Such research should include anthropological, sociological, psychological, and economic studies. It is further recommended that the information so obtained be utilized in planning and operation of *Servicio* projects, both to determine the economic and social potential of a country which sets absolute limits on the changes which can be brought about, and for the purpose of reducing to the lowest possible level cultural barriers to general acceptance of public health programs."

Dual Role of the Social Scientist

This statement, though general, emphasizes the dual role in which the social scientist was found to be of use: participation in the original planning, and subsequently in the operation of the programs.

The planning role stresses the necessity of finding out the nature of a culture, the way of life of the people, the motivations that make them do the things they do, their goals in life,

the objectives they are willing to strive for, and, conversely, the aspects of life that mean very little to them or that they fail to understand. An understanding of the whole cross section of the way of life of the people of a country is almost essential in order to determine limits of any program. What are the people willing and able to accept? What will they reject? What are the social and economic conditions which must exist before certain innovations can be introduced into a culture? If necessary, how can these conditions be brought about?

In the operation of the program, the social scientist's role is that of the educator. After the most practical public health program for a given country or area is determined the people must be convinced that the program really is good for them, that it is in their interest to adopt the new and abandon the old.

Two basic propositions, implicit in the above recommendation, guided the research of the anthropologists:

1. Cultures are integrated functional wholes. Public health programs should be planned and analyzed in relationship to, and as one aspect of, these wholes.

2. There are definite, though imperfectly understood, rules of human behavior which govern the processes whereby changes are brought about in culture. Specifically, popular resistance to public health programs can be scientifically studied, and methods can be developed whereby these resistances can be greatly reduced.

Anthropologists were the first social scientists to formulate the hypothesis that the way of life of a people is an organic, functional, total complex. If the analogy is not carried too far, a culture may be compared to a biological organism in that each of its parts is related in some way to all other parts. Each part fulfills a definite function in relationship to the other parts and contributes to the normal functioning of the body as a whole. Each part, in turn, draws upon all other parts for its own continued existence.

In terms of a public health program, this hypothesis means simply that health and sanitation are not isolated parts of the life of a whole people. They are related to education, social security, economic productivity, distribu-

tion of income, city planning, and a great many other things. Changes in the level of health in any given place may result from changes in the aspects of culture just mentioned; conversely, changes that can be brought about by a given activity are limited by and dependent on the changes that are occurring simultaneously or that can be brought about in these related aspects.

An Exploratory Project

It is possible, the anthropologist believes, to bring about only limited changes in any aspect of culture without accompanying changes in the other aspects of the culture. It is impossible, he believes, to take a very backward country or area and introduce into it a first-class public health program. A specific Institute health program in one of the Latin American countries illustrates this point.

Planning of the program was carried out with great care and thought. There was recognition that a successful public health program depends to a very considerable extent on raising the general economic level of the people. There was recognition that training in home economics and practical farming were integral factors which would contribute to the success of the program. It was decided, therefore, to work in an area where it would be possible to have the cooperation of another agency which was carrying out work in agriculture and home economics. In the small village selected, experimental gardens were set up; training in home economics was introduced; a health post was established, and arrangements were made to bring in a physician and a nurse several times a week to practice both preventive and curative medicine.

Nevertheless, in spite of such planning—excellent as far as it went—certain cultural characteristics of this village became apparent when an overall analysis was made, which raises doubts as to any great degree of permanent success as far as some of the main projects are concerned.

The keystone of the environmental sanitation phase of the work consisted of a privy campaign. Slabs for pit privies were cast locally and given to each of the 100-odd houses in the village. With this preliminary aid, it was expected that within several months most of the

slabs would be in place in back yards, the cost of installation borne by the householder. But 6 months later less than half the slabs had been put in use. The majority were still lying against the front of the houses where they had been placed, overgrown with weeds, and non-existent as far as the householders were concerned. What were possible reasons for this situation?

A census of this village of 600 people was made and the following facts came to light: The village was highly unstable in terms of social organization. About half the inhabitants had lived there for 5 years or less. They did not consider themselves as really permanent members of the community, but rather as migrants who had stopped there while awaiting the opportunity to move on. They felt no attachment to the community, no stake in its future, and they had no interest in making capital investments in something they might not be around to enjoy. A measure of the social disorganization of the village and of the transitory nature of the population was the fact that five professional prostitutes plied their trade, a remarkably large figure in comparison with the average settled Latin American village.

In addition, the land was marginal and wages were low. The least expensive houses in the village were worth from \$18 to \$35. Instructions for building privies were fairly precise, and the cost was about \$10. This meant that people who knew very little about environmental sanitation, who had nothing in their cultural background to make them understand or realize the importance of pit privies, were being asked to make an investment of from 25 to 50 percent of the total value of their homes. It was quite obvious that most of these lower income families could in no way be persuaded to make an investment of this magnitude.

From the census it was also discovered that a considerable number of people in this community lived rent-free in the homes they occupied. The owners were away for extended lengths of time, or they had migrated to other places but had kept their old homes. In order to have their property cared for, they had permitted relatives or friends to occupy the dwellings. Since the actual inhabitants were not the owners and might be put out on a moment's

notice, they were unwilling to spend a relatively enormous sum to build a privy. The owners had little incentive to make such a capital investment since they would not be there to take advantage of it.

Problems of Education

Once it is decided what type of public health project will work in a given place, what is compatible with sociological and economic possibilities, what will have maximum effectiveness in raising general health standards, the problem remains of convincing the people of the need for the project. The planners' ideas as to what is necessary for good health frequently and perhaps usually do not correspond with the felt needs of the people. An important and difficult job of education must be carried out.

The essential problem is this: How is it possible to convince the people that modern medicine and hygienic living are a form of personal health insurance that will keep the individual in better health, make him live longer, and make him able to work more efficiently and enjoy life more fully? How can people who consider much of illness to be due to magical causes or divine will be made to understand scientific concepts of disease and germs, and be made to act accordingly? How can such people be persuaded to take elementary health precautions to avoid disease, to come to the doctor at the first sign of illness, to follow closely the doctor's prescribed treatment, and to avoid the *curandero* (the native medical practitioner) and associated folk remedies?

Fundamentally, the problem is one of persuading people to drop old habits and ideas and to substitute for them new ones which heretofore have been outside their conceptual world. The public health specialist is not operating in a vacuum; his subjects do not feel he is bringing light on a problem about which they know nothing. Rather, he is working in an area in which the subjects already have definite and hard-to-shake beliefs which they are as convinced are correct as he is certain are mistaken. They are not at all sure the doctor's ideas are better than those of the *curandero*; rather, they are often convinced the doctor's ideas are inferior.

Anthropological Techniques

Before attempting to answer some of these questions, the working techniques used by the anthropologists in gathering their data may be noted.

The health center was the focal point of a majority of the analyses. Anthropologists interviewed the directors of these centers, the physicians, nurses, sanitary engineers, sanitarians, and nurse's aides. They sat in the physician's room for as long as 3 hours, observing his techniques with a variety of patients.

Nurses were similarly observed. They were accompanied on visits to the homes; they were studied at BCG-vaccination centers, at "mothers' clubs" where pregnant women were given instruction, and at volunteer workers' training sessions.

Operations of *Servicio* hospitals were also observed. On a random sampling, door-to-door basis, interviewing of populations within the area of health centers was done to obtain a cross section of public opinion with respect to *Servicio* projects.

Health education programs were studied, and limited experimental work in health education was carried out. Tests were given in nursing schools to determine the extent of retention of erroneous folk beliefs among nursing students.

Use was made of the usually rather poor statistical data available.

Informants were "worked" in typical ethnographical fashion to formulate the basic patterns of folk belief concerning health and disease.

The data gathered provided a rather full description of folk medicine in the seven countries studied, including information on the types of illness for which patients will consult doctors and the types which they prefer to take to the *curandero* or treat with home remedies; a good knowledge of health center operations as they impinge upon patients; information on attitudes of patients, potential and former, toward health centers, hospitals, and the medical profession in general; and information on attitudes of physicians, nurses, sanitarians, and other personnel toward their jobs, toward each other, and toward patients, and their ideas of

their problems. Statistical data showing the extent to which *Servicio* programs were patronized were analyzed, as were data on community organization and the possibilities of stimulating better organization as an aid to public health programs. Very significant information on the relationship between curative and preventive medicine, as they bear on public health problems, was obtained.

From the masses of field notes, several general categories of data emerged. Those selected as bearing directly upon the objectives of the survey were (a) interpersonal relations; (b) relative emphasis on curative and preventive medicine; (c) the nature of folk medicine; and (d) general cultural factors which impinge upon public health programs.

INTERPERSONAL RELATIONS

In all countries observed it was apparent that genuinely sympathetic relations between the physicians, nurses, and other *Servicio* personnel, and the patients, are essential for smoothly functioning programs. If the interpersonal relations are good, an average or mediocre program, so far as planning is concerned, can be highly successful; conversely, the most brilliantly conceived program amounts to very little if interpersonal relations are poor, if the program is administered in a mechanical manner, if the people who carry it out are not genuinely sympathetic toward the needs and problems of the people they are supposed to be helping. This observation sounds more like a truism than the result of scientific analysis; it is made because, obvious as it may be, many *Servicio* programs are falling short of their potential because of poor interpersonal relations between staff members and patients.

How can good interpersonal relations be achieved? This is a complex problem which admits of no easy solution. In part, it is due to the rather rigid concepts of class and caste which prevail in Latin American countries, with culturally determined modes of contact between different classes. In part, it is due to a lack of education of the masses, and to innate fear and suspicion of members of one group toward mem-

bers of others. The solution will begin to come as these social barriers are broken down.

Public Health Nurses

There is one key to the problem, however, which holds out great hope for the immediate future. Without exception, the anthropologists were impressed with the importance of the role of the trained public health nurse, the university graduate. In Mexico, in El Salvador, in Ecuador, in Chile, in every country from which information was available, a most important factor making for the success of a public health program was seen to be the availability of graduate public health nurses. Even when the attitude of the physicians is cold and unfriendly, good public health nurses can do much to establish good relations between the health center and the patients.

In a *Servicio* center in a large capital city, for example, some physicians observed were very unfeeling. Nevertheless, a competent group of public health nurses had succeeded in establishing themselves as friends of the people. When the nurses made home visits, children often saw them at a distance and ran with the news to their mothers, who greeted the nurses at the door with a smile and warm reception. Mothers regarded the nurses as real friends, not just as nurses, and as their buffers against the cold formality of the center itself.

Naturally, there are great differences between nurses who have had identical training. Nevertheless, the great majority of Latin American public health nurses who are graduates of good schools are excellent in their interpersonal relations with patients.

The Need for Nursing Schools

Although *visitadoras* (nurse's aides), often with as little as 4 years of basic education, were not observed to the same extent as were the nurses, it was felt that they functioned far less successfully. Often they knew little more than the people they were trying to help; they were timid, unsure of themselves, lacking in basic education, and unable to inspire much confidence. Faith in their ability on the part of professional personnel generally was low,

nurses saying that they must be closely watched all the time, and physicians saying that their turnover was high because of low salaries and because after learning a little they would go into business as *inyeccionistas* (dispensers of hypodermic injections).

The anthropologists felt that every reasonable effort should be made to stimulate the development of more nursing schools, that perhaps even more emphasis should be placed on this aspect of Institute activities than in the past. A question has been raised as to whether *visitadoras* should be eliminated entirely, but practical necessity dictates their continued use. If greater attention is given to the educational and cultural background of future *visitadoras*, and if their training is planned accordingly, it is probable that their effectiveness can be considerably increased. In Brazil, for example, good use appears to be made of them. But *visitadoras* can never be more than a poor substitute for well-trained nurses.

PREVENTIVE vs. CURATIVE MEDICINE

The problem of good interpersonal relations between *Servicio* staff members and patients is linked with the question of curative versus preventive medicine. When the initial studies were made in Mexico, Colombia, Peru, and Brazil, significant differences in the quality of the interpersonal relations were noted. To illustrate, it appeared that there was a closer understanding between staff members and patients in Brazil than in Peru. The first hypothesis advanced to explain this situation was rooted in the problem of class structure. In the Latin American countries which have a comparatively large Indian population, it was observed that educated city people tended to look upon the less fortunate, and particularly the Indian groups, as beings from another world incapable of being assimilated as useful members of national life. At first glance it seemed as if in those countries where these conditions prevailed the quality of interpersonal relations was generally poor.

Following subsequent work in El Salvador, Ecuador, and Chile, it became apparent that this tentative formulation did not hold. In

Ecuador the social gulfs are about as marked as in any American country; yet the physicians and nurses appeared generally to get along well with the patients. Tensions and frictions seemed much less prevalent than in Colombia, where the socioeconomic level was much higher and class differences were less pronounced. The tentative hypothesis of anthropologists—and it should be tested further—is that in those countries where there is frank recognition that for a long time to come curative medicine must be an integral part of any public health program, relations between staff members and the public are good. Conversely, where curative functions are grudgingly accepted by the *Servicio* authorities or avoided entirely, interpersonal relations are poor, and public health programs are much less successful.

Whatever the merits of a public health program based on preventive medicine, the fact remains that the average Latin American is interested in physicians and nurses because they can cure his ills. He usually avails himself of *Servicio* services not primarily to keep well, but to get well.

A survey of 100 families was made in the area of the Beatriz Velasco Aleman Center in Mexico City to find out who patronized the center, and why. Half of the people interviewed had never been to the center. Of the approximately 50 families that had gone, 25 went because they had a sick child that needed attention; 12 went because they could get free milk; and a number of others went because they needed chest X-rays or other clinical services. Only 3 or 4 gave as their main reason for attending the clinic their desire for a routine checkup of an infant. Conversely, one of the principal reasons why mothers had not taken their children was the fact that they were well—"why should one take well children to see a doctor?"

Popular Concepts of Health

This reluctance to seek or accept medical advice when apparently well is deep-rooted in Latin American concepts of well-being. Health, it is thought, consists in feeling well; it is not possible to be ill if one feels well and has no evident symptoms of disease. Since

sickness is due to sins of omission or commission, or to fate or luck, there is very little a well person can or ought to do to keep himself well, at least as far as a physician's attentions are concerned. Treatment is sought only when a person becomes ill.

This feeling about health, which is all too common with the uninformed, is akin to the concept of machinery maintenance: If a machine runs well, obviously it is in good condition and needs no attention; it is logical to repair it only when it breaks down. Periodic checkups have no logical reason or explanation in the minds of people with this point of view. They feel they are doing the center a great favor in keeping appointments, rather than that they are being helped. There seems to be no stimulus sufficiently strong to keep well people coming to health centers, unless certain concessions toward what the people believe they need are made.

Persuasion by Demonstration

Moreover, there is a deep-seated distrust of the motives and knowledge of physicians in much of Latin America. Many people feel that the native *curandero* knows more than a physician, and everyone can and loves to tell of situations in which the physician failed and the *curandero* effected a cure. At the same time, the average Latin American is pragmatic by nature. One of the reasons, therefore, why *Servicio* programs should stress curative medicine is that it is about the only way the physician can show the patient that he knows what he is doing.

To illustrate, in Temuco, Chile, a bad whooping cough epidemic occurred in 1951. Fortunately, health authorities were in a position to vaccinate a large number of children and to arrest the spread of the epidemic. There is no doubt in the minds of most mothers in that town that the physician is a good man to know when whooping cough threatens. And this faith has spread to other inoculations as well; BCG vaccinations are being carried out with a high degree of cooperation from all.

A similar case was noted in Quito, Ecuador. As in much of Latin America, the people in this city believe that fresh air is dangerous, particu-

larly for new mothers. Many complaints against the new *Servicio* maternity hospital were believed to stem from the fact that there is too much fresh air. But even more people remarked, "Fresh air is dangerous, but there is plenty of it at the *Maternidad* and it seems to harm no one, so maybe after all it isn't dangerous." Similarly, new mothers are sent home after a stay of about 5 days, whereas the culture pattern dictates that the mother should remain in bed as long as 2 weeks. There were criticisms of this short stay, but again the remark was heard that the *Maternidad* mothers had more and better babies, with no apparent harm to mother or child, so perhaps the physicians knew what they were doing. Thus, educational work, essential to any public health program, was being carried on in a forceful manner.

The satisfaction of the patient in receiving a public health service which he or she wants and the satisfaction of the physician and nurse in offering a service a patient desires seem to have promoted an atmosphere in which suspicion and tension have been reduced to a minimum, and in which, as a consequence, really good preventive measures can be effected. In the Cerro Barón Center, Valparaiso, Chile, where curative medicine is recognized as just as important as preventive medicine and where no sick child is ever turned away, more than half of the visits are "well baby" visits. By meeting the felt needs of the people—helping them when they are ill—the physicians and nurses have been able to persuade a sizeable portion of the people that it is a good idea to take preventive measures even though an individual is perfectly healthy.

If the premise is accepted that in the long run better world health will result from preventive medicine, the fact must also be recognized that a sizable amount of curative services must be available to develop the conditions essential for a preventive program.

NATURE OF FOLK MEDICINE

If *Servicio* personnel were better acquainted with prevailing concepts and practices of folk medicine, many opportunities would occur for contributing to the overall effectiveness of pro-

grams. Although in Latin America there is no single integrated theory of disease, there are certain common themes and patterns which are so general as to form a framework within which local variations can be studied. These ideas of health and illness are the end result of a long period of fusion of two currents of thought: the American Indian concept of the universe and man's place in it, and the ancient medical heritage brought to the New World by the Spaniards.

Heritage of Hippocrates

Probably the largest single element in the Latin American beliefs is that which has come down through two milleniums from the humoral doctrine of Hippocrates and Galen. Health resulted, according to that theory, when the four humors—blood, phlegm, yellow bile, and black bile—were in proper proportions in the body. These four humors, which corresponded to what were believed to be the four elements of the universe—fire, air, earth, and water—were characterized by opposing qualities of heat, cold, dryness, and moistness. This doctrine, with subsequent modifications and elaborations, reached Spain and Western Europe via the Arab world and was transmitted to Hispanic America, where it remained the basis of medical classification and teaching until the 18th century. Selected aspects of this theory—particularly the concept of heat and cold as qualities of the body, of types of illnesses, and of foods and herbs—became part of the folk belief of most peoples. General concepts of “humors” have also prevailed.

Hence, there has come to be a widespread tendency to explain much illness in terms of “heat” or “cold,” qualities which do not necessarily indicate actual temperatures, but which are innate attributes of substances. Pneumonia, for example, is often classified as a “cold” disease, whereas typhoid fever may be a “hot” disease. Foods, as well as herbs and other remedies, are also frequently classified as “hot” or “cold.” In Xochimilco, Mexico, for example, some of the “hot” foods are sugar, honey, green chile pepper, brandy, black coffee, human milk, garlic, peanuts, onions, and salt. “Cold” foods are rice, spaghetti, potatoes, most

meats, beans, most leafy vegetables, most fruits, coffee with milk, and chocolate. A concomitant belief is that “hot” illnesses should be treated with “cold” medicaments and foods, and vice versa. Although there is no universal agreement as to which foods or diseases are “hot” and which are “cold,” this concept of illness exists in most parts of Latin America.

The “hot” and “cold” distinction provides a scheme for defining under what conditions certain foods can be eaten, what the results will be if the scheme is violated, which remedies can be used for which illnesses, and what the results will be if these rules are transgressed. In short, it appears that “hot” and “cold” distinction provides a general framework of do's and don'ts for much of popular medicine in Latin America.

The “Clean Stomach” Belief

A second common belief is that periodic cleansing of the stomach and intestinal tract by means of strong physics is essential to health. The common Latin American practice of taking a physic every 3 or 4 months is rooted in this concept. The belief seems to be associated with the idea that the liver is a chief source of illness, and that purification of the blood is essential to recovery from illness or maintenance of health. The relatively high proportion of digestive upsets among persons questioned suggests the reason for preoccupation with the stomach, and also explains the extraordinary number of herbal remedies which “wash the stomach clean.” Preoccupation with the blood is exhibited in the general belief that extraction of blood for venereal disease or other tests weakens the patient, and explains why in some communities health authorities making periodic checkups of children have been run out of town by irate parents.

Causative Beliefs

In each country or area studied, folk medicine was found to have a core of principal illnesses, none of which has an exact equivalent in modern medicine. Each illness has a recognized cause or causes, symptoms, and cure, and can be described in the same way the medical practitioner describes the etiologies, syndromes,

and cures of the diseases recognized by modern science.

Some "folk" causes may be said to be "rational," in that they are explained on the basis of the body of empirical knowledge to which the group has access. The knowledge may be erroneous in terms of modern science, but it makes sense in terms of the logical premises of the group. For example, the widespread belief that experiencing abnormal cold is the cause of respiratory illness is "rational."

Closely related to extreme cold as a causative agent is *aire* or *mal aire* ("air," "bad air"), when this is explained as an actual current of air which cools the body, producing various types of illnesses. Contracting *aire* is almost inevitable if one emerges from a house when warm, or if one breathes air much colder than what one has just been breathing. From these beliefs stems the Latin American idea that central heating is unhygienic if not actually dangerous. The violations of "hot" and "cold" food prohibitions, when such violations lead to illness, may also be classified among the "rational" causes.

The role attributed to "microbes," however poorly the term is understood, is another evidence of a rational pattern. For example, the recognizably contagious qualities of such diseases as measles and smallpox make them fall in this category. The belief that gonorrhea comes from intercourse with a menstruating woman or from sitting on a hot rock, that malaria comes from eating certain fruits or not sleeping enough at night, and that "bad odors" cause illness, as well as the Chilean concept of *empacho*, likewise are "rational." The latter is one of the most common folk ailments afflicting children and is believed to be caused by an object such as green fruit, soft bread, or half-cooked food becoming stuck in the stomach or intestines.

"Natural" Causes

In general, illness and injury which are explained as due to such "rational" or empirically determined causes are considered by the folk to be "natural." The most common "natural" diseases have names which correspond to those of modern medicine, and in terms of popular syndromes and sometimes etiologies, but rarely cures, they are essentially the same. They in-

clude whooping cough, colds, grippe, appendicitis, diphtheria, measles, chickenpox, smallpox, intestinal worms, diarrhea, venereal disease, typhoid fever, pneumonia, and tuberculosis.

"Magical" Causes

Other causes may be said to be magical or supernatural in form, in that they lie outside the body of empirical knowledge of the group and are not verifiable or understandable in terms of that knowledge. *Mal de ojo* or *el ojo* ("evil eye") is the most widespread "illness" in Latin America which is explained in magical terms. Certain individuals are believed to have the power, often unintentional and sometimes unknown to themselves, of causing illness in small children by looking at, touching, or admiring them.

Sometimes *susto* ("fright") is magical in origin, in that a malignant spirit or ghost may take possession of an individual or be the cause of the fright. Bewitchment, which involves sticking pins into, or otherwise injuring, rag dolls or images representing a victim, is not uncommon. The belief that a corpse emanates a cold essence which can cause bystanders to fall ill, unless ceremonial bathing or cleansing follow, is another example of a supernaturally produced condition. In El Salvador this emanation is *hijillo*, and in Colombia *hielo de muerto*. *Mal aire*, when the malevolent air is due to evil spirits, is a supernatural happening, as are *entuentos* (postpartum pains caused by contraction of the uterus), widely believed to result when the placenta is not disposed of in ritual fashion.

Psychological Causes

Folk recognition that strong emotional experiences can cause an individual to fall ill is evidenced by the wide variety of sicknesses that are essentially psychosomatic. Those emotional experiences which most often produce physiological results include fright, anger, desire, imagined rejection, embarrassment or shame, disillusion, and sadness. *Susto* or *espanto* results from fright, and, frequently, it is explained as a shock which separates the spirit from the body. The cure depends on inducing the spirit to return to its temporal home.

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Colerina is the term often used for disturbances produced by great anger or rage; in Mexico epilepsy is thought to be due to this experience.

Desires are called *antojos*; unfulfilled food desires of pregnant women may result in birthmarks, whereas those of small children will cause the child to suffer gastric upsets. In Chile, the wise parent, consequently, never denies a child any food, drink, or sweet it wants, however inappropriate it may be. In most countries sibling rivalry is recognized, often in a form in which a child shows unconscious resentment toward an unborn child of its mother. In Mexico this jealousy is known as *sipe*, in El Salvador the child experiencing this feeling *está peche*; in Ecuador *pasión* results; in Peru the term is *caisa*, and in Chile it is *pensión* (anxiety). In Peru embarrassment or shame produces *chucague*, and in El Salvador it causes a bothersome sty known as *pispelo*. The Peruvian *tiricia* is the result of a strong disillusion, and the Ecuadorian *mal de corazón* results from the loss of a loved one, loss of money or property, or some similar saddening experience.

"Popular" Curative Techniques

Folk cures make use of a variety of techniques, the most common of which is the drinking of herb teas. Massage is often resorted to, and it is usually explained as an action that removes the illness or poison from the body. The famous egg-rubbing of the body of a child believed to suffer from the evil eye falls in this category. A warm, freshly laid egg is passed over the body of the patient, then broken open and examined; if a spot appears on the yolk it is assumed that *el ojo* has struck the child. This diagnostic practice is also believed to have therapeutic value.

Poultices are often used, sometimes for mechanical effects but more commonly for magical reasons: in Peru and Colombia a live pigeon is split open and applied to the body for certain illnesses. Diet, with special attention to the "hot" or "cold" qualities of the foods, is of importance in all places. Certain days and certain hours of the day are often used for curing. Religious orations and creeds frequently are recited.

Medical Practitioners

Folk medical practitioners are most commonly called *curanderos* (feminine, *curanderas*), though other terms are encountered. Midwives are called variously *parteras*, *comadronas*, or *curiosas*. Usually these men and women occupy their positions after long periods of formal or informal training, not infrequently as apprentices or assistants to older practitioners. Only rarely do they have divine or supernatural powers to aid in their cures. Sometimes they may use "black magic," but this also is relatively rare. In general, they are honest, sincere practitioners and respected members of the community. Beyond doubt, they frequently cure sickness and alleviate suffering; their knowledge of herbs, as well as of psychology, must be very considerable. In most cases they cannot be looked upon as witch doctors or as frauds or shams.

A Prevalent Dichotomy

A more or less pronounced dichotomy exists in the minds of many Latin Americans between "folk" illnesses and those recognized by medical science. People know that certain types of disease, which do not respond to treatment by *curanderos*, can be cured or prevented by the physician. At the same time they feel that there are other illnesses that are best treated by home remedies or *curanderos*—illnesses which are not understood by physicians, and the very presence of which is denied by physicians. These illnesses are generally those here referred to as "folk" diseases, particularly those described as having magical or psychological etiologies. If an illness is diagnosed, for example, as evil eye, obviously it is poor judgment to take the patient for treatment to a person who denies the existence of the disease. To illustrate, in Valparaíso, Chile, a public health nurse visited a home and found a child suffering from bronchial pneumonia. She asked why the child had not been brought to the health center for treatment and was told, "The child is suffering from evil eye, and you know as well as I that the doctor does not know anything about the evil eye."

This dichotomy is not hard and fast; there

is no sharp line in the minds of all persons between the two categories. Yet the common tendency on the part of physicians and nurses to ignore or ridicule folk concepts of illness undoubtedly at times reduces their effectiveness in that this attitude reinforces the dichotomy. As a result, many genuinely sick persons do not receive proper medical treatment. Although there is a growing awareness of microbes in Latin America, there is a marked tendency to understand by "microbes" those things that cause the illnesses that physicians can cure. Microbes have nothing to do with the *el ojo*, *susto*, and the like.

Several attempts were made to measure the extent of the practical effect of this dichotomy between "folk" and "doctor's" diseases. In Quito, Ecuador, a list of the most common complaints was given to 48 school children of both sexes, ages 11 and 12 years, and they were asked to indicate which illnesses they would take to a doctor and which they would treat with home remedies or take to a *curandero*. It was assumed that the opinions expressed would correspond closely with those which they had heard from parents and other adults. Results are shown in the accompanying table.

In Chile a similar test was made, and similar results were found; the evil eye, *aire*, *empacho*, and *pasmo* (facial paralysis thought to result from exposure to air) were universally agreed upon as being unknown to doctors. Individuals suffering from these diseases would therefore receive home treatment, often gravely prejudicing their chances of recovery since the symptoms are often symptoms of serious illnesses. Anemia, appendicitis, hernia, meningitis, pneumonia, smallpox, typhoid, and the like, generally (but not invariably) were thought best treated by doctors. Results of a survey in Colombia also were similar. Illnesses with magical or psychological etiologies tended to receive home treatment or that of the *curandero*, whereas those due to "natural" causes were more likely to be taken to doctors.

The Physician and the Curandero

The conflict between folk medicine and scientific medicine is summed up in the persons of the physician and *curandero*. Each repre-

Percentage of 48 school children in Quito, Ecuador, who would consult a doctor or a *curandero* for specified illnesses

Illness	Would consult a <i>curandero</i> or treat with home remedies (percent)	Would consult a doctor (percent)
Fright ¹ -----	98	2
Air ¹ -----	93	7
Witchcraft ¹ -----	86	14
Colic-----	79	21
Evil eye ¹ -----	75	25
Stomatitis-----	72	28
<i>Pasmo</i> ¹ -----	66	34
Open infections-----	66	34
Urinary complaints-----	64	36
Skin disorders-----	61	39
Diarrhea and vomiting-----	58	42
Emaciation-----	49	51
Smallpox-----	31	69
Dysentery with blood-----	25	75
Pneumonia-----	25	75
Whooping cough-----	20	80
Liver complaints-----	16	84
Paralysis-----	9	91
Typhoid-----	7	93
Bronchitis-----	6	94
Malaria-----	5	95
Tuberculosis-----	4	96

¹ Diseases with magical or psychological etiologies.

sents the highest achievement in his field. The attitudes of the people of Latin America toward each, therefore, are pertinent to this study. Unfortunately, the physician frequently comes off second best. This is due in part to the inherent nature of the situation, and in part to native suspicion of individuals in other social classes, particularly those above them.

The *curandero* operates under conditions that are relatively more favorable than those of the physician, from the point of view of impressing the patient with concrete results and apparent success. He treats folk illnesses, the symptoms of which often are so ill-defined that he cannot help but succeed in alleviating them. If the vague physiological symptoms identified with the illness persist or reappear after the cure, the *curandero* can always say that the case has become complicated and requires another series of cures or a different cure, or that a new and different illness has attacked the patient. Also, most *curanderos* do not claim to cure all illnesses, and in many cases can even recom-

mend that a patient consult a physician. These factors establish the *curanderos* in the minds of the folk as fair, open-minded individuals willing to admit their limitations. Finally, the *curandero's* diagnostic techniques do not require elaborate and exhaustive questioning of the patient as to symptoms, case history, and the like. He has certain magical or automatic devices which he applies to specific situations, and the answers follow almost like clockwork. Moreover, there are many cases reported by field observers in which a physician failed to cure an individual and a *curandero* had apparently genuine success.

The physician enjoys few of these advantages. His diagnosis is seldom cut and dried, he cannot guarantee quick results, and he seldom enjoys the faith and confidence accorded the *curandero* because he is from a social class instinctively distrusted by the majority of his patients. Moreover, the physician seldom admits that a *curandero* can cure things which he is incapable of treating, and this is interpreted as meaning that he conceitedly and selfishly believes himself to be the sole repository of medical knowledge—a point of view which the village is loath to accept.

Criticisms of physicians and their professional methods are rife among the patients of the lower class, and such criticisms are usually based on a complete lack of comprehension of medicine, its methods, and its limitations. Several patients pointed out that physicians asked them questions about their symptoms, which showed that the physicians were not as smart as they thought they were. A good *curandero* doesn't have to ask questions, so why should a man who pretends to know a great deal more have to do so? Another patient scornfully pointed out that a president of Colombia died "even though he had 50 physicians at his bedside." The implication was that if 50 physicians could not keep a man from dying, a single doctor in a short interview was almost worse than worthless.

A final handicap of the physician is the general tendency of the people to exhaust home remedies and the arts of the *curandero* before appealing to the physician. The physician, therefore, gets many cases too late to effect a cure and many others which are simply in-

curable. Hence, the failures of folk medicine as well as those of his own profession are heaped upon his shoulders.

Utility of Cultural Knowledge

If the people in Latin America could come to believe that the physicians and nurses understand the folk beliefs concerning health and sickness and approve of some of the folk remedies (for example, isolation, bathing, specialized diet, and herbal teas), but that they simply feel that for many things they have even better methods, it is very likely that the people would evince greater tolerance for modern medicine. There must be great numbers of people who would like to follow a physician's recommendations but are afraid to do so because of folk tradition or because of doubts arising from the feeling that the physicians do not know about some types of sickness.

The utility of knowledge of folk concepts of illness and treatment has been demonstrated. In Chile, as in the other countries, herbal teas form an important part of the *curandero's* pharmacopoeia, and popular confidence in them is great. For infant diarrhea some *Servicio* physicians therefore prescribe, in addition to other remedies, herbal teas. Drinking quantities of liquid is part of the treatment for diarrhea; by the device of teas it is possible to insure boiled, and therefore safe, water. Thus, by interpreting treatment in terms of local belief, the physicians have convinced the mothers that they know what they are talking about, and at the same time, have assured proper treatment of the child.

In Ecuador—and most of the rest of Latin America—it is believed that young children are "delicate," that they are more susceptible to danger from witchcraft, microbes, and other disease-causing agents than adults. A water supply system was installed by the *Servicio* in Tulcan. Adults showed little interest for themselves in a source of pure water—they had been drinking contaminated water all their lives, with no apparent ill effects—but they recognized that their children were more vulnerable than they. By placing the emphasis for the need for pure water upon the health of the children, rather than on health in the abstract, greater interest was aroused.

In Colombia, *malos olores* (bad odors) are popularly believed to cause disease. Typhoid fever particularly is described as a disease associated with bad smells. For this reason, considerable opposition to pit privies exists in some places. Greater attention to means of deodorizing pit privies might very well result in their greater acceptance. Conversely, knowledge of this belief ought to provide a strong focal point to gain support for sanitation campaigns, particularly modern sewage- and garbage-disposal plans.

In Mexico, isolation of patients is a part of the treatment of some illnesses. In most cases isolation stems from the belief that the patient is in a weakened condition and that visitors knowingly or unknowingly might further injure him, particularly through the evil effects of *aire*, of strong body "humors," or of "strong" blood. There is little thought that a patient is coughing germs which may infect others in the family. But, whatever the folk reasoning, an essentially hygienic practice is followed, one that can be successfully utilized by physicians and nurses in the treatment of communicable diseases. The nurse need not remark on the potential danger of *aire*; she can simply say that visitors are undesirable, and the family will probably follow her recommendation, even though she is thinking in terms of contagion and they in terms of magic.

GENERAL CULTURAL FACTORS

More general aspects of Latin American culture patterns bearing upon the Institute's public health programs were also covered in the evaluation. Mexico furnished a striking example. A survey had shown that in a large urban health center 43 percent of registered women discontinued prenatal treatment before delivery, the majority failing to return to the center after the first gynecologic examination. In a nearby semirural health center only 21 percent discontinued treatment. Allowing for some variation because an urban population is less stable than a rural one, there was nevertheless a significant difference between the percentages for the two centers.

The explanation seemed to be based on Mexi-

can (and Latin American) ideas of decorum and modesty. The first prenatal examination comes as a great shock to most women. The examination itself is embarrassing, and is doubly so when it is made by a man. In the rural health center the women were carefully prepared for the experience. The nurse explained just what would be done, why it must be done, that it probably would be done only once during the course of treatment, and that she (the nurse) would be present all the time. In the large center the patients were given little idea of what to expect.

In another center, in Colombia, there was practically no gynecologic examination. The women refused to submit to it, partly because of their own feelings, and partly because their husbands were outraged at the idea of any other man having such intimate contact with their wives.

Even in Chile, where health services were generally well advanced, it was noted in a large health center that the gynecologic examination, such as it was, was done by a midwife, the physician hardly looking at the patient beyond taking her pulse and listening to her chest. On the other hand, in a small center in El Salvador where women were well prepared by the nurse, there was little embarrassment shown during examinations, and relatively few of the women failed to return for further treatment.

The impersonality of modern medicine runs into a cultural barrier of considerable importance in Latin America: Prevailing concepts of modesty are incompatible with the requirements of medical treatment. At the very least, a thorough and sympathetic explanation appears to be necessary to make gynecologic examinations generally acceptable.

Physician-Patient Communication

Cultural factors pose serious barriers to full development of public health programs in other ways, too. In all countries studied the problem of communication between physicians and patients existed. A significant number of patients, after seeing the physician, did not know what they had been told to do.

In the Cerro Barón Center in Valparaiso, Chile, one of the finest in Latin America, 13

women were asked as they emerged from the physician's room to repeat his instructions. The remarks of 10 indicated that they had failed to profit from the visit. Similar results were found in the other countries. In the Cerro Barón Center, and in some other centers, this problem was partially solved by having the physician write the instructions on the patient's record card. Before leaving the center, the patient would visit the nurse, who would repeat from the card the instructions and explain in greater detail what the patient was supposed to do.

Failure to comprehend the physician's instructions was due to a variety of reasons. Often, a woman patient would be nervous and uneasy in the presence of a man, particularly since she usually was in a lower social class than he; she would therefore be unable to concentrate or to grasp what was being said.

Development of greater rapport between physicians and patients will partially solve this problem. But it must be realized that the manner in which instructions are phrased is also highly important. What appears simple and logical to an educated person may not be at all simple to a less well educated, often illiterate, individual. In the United States, it is taken for granted that patients will understand what is meant by such instructions as "every 3 hours." Yet in much of Latin America this expression is meaningless.

In a Mexican center, for example, the physician told a mother to nurse her baby "every 3 hours." The anthropologist asked the mother at what hours she would feed the child. "At six, seven, eight, and so on," replied the mother. The startled physician repeated his instructions, and the anthropologist again asked the mother when she was supposed to feed the child. The answer was the same. Instructions in terms of time as defined by hours simply were meaningless to this woman.

When significant numbers of a center's patients come from illiterate and low-income groups, groups which are not used to clocks, it would seem wise to work out adaptations of the time concept in terms of phenomena which would have meaning to the people. In most cities, there are factory whistles, municipal sirens, church bells, and the like, which sound at

regular hours. Time points with meaning for each area could be established, and instructions might be phrased in such terms.

A similar case of misunderstanding was noted in Temueo, Chile, where pregnant women were told by the physician to walk 3 kilometers a day if they felt well. At a meeting at which volunteer nurse's aides were being trained, the nurse asked, "How much exercise should a pregnant woman take every day?" All trainees promptly replied, "Walk 3 kilometers daily if you feel well." The anthropologist asked, "How far is 3 kilometers?" This precipitated a lively discussion. Some women thought that the cipher "9," and others that 27 blocks, was a part of the formula. The women were unable to agree as to how far 3 kilometers is in terms of blocks. As in the case of time instructions, these instructions were of no use whatsoever to the audience toward which they were directed because the people were not trained to think in the same terms as the physician.

Hours of Work

Bureaucratic hours and practices were found to constitute a considerable cultural barrier to full acceptance of some *Servicio* projects. In much of Latin America, government hours are from 8 a. m. to 2 p. m., or a similar time period. Allowing time for opening and closing the office the effective hours are considerably reduced. Moreover, since full-time physicians are the exception rather than the rule, many physicians are at the health centers only an hour or two a day and have considerable latitude with respect to arrival time.

To be reasonably sure of attention, then, a patient must come early in the morning and await her turn. For a busy housewife, with many small children to get off to school, morning marketing chores to do and a husband coming home at noon to eat, the loss of half a day was found to be an almost insurmountable difficulty. Loss of time was the single most frequent complaint from health center patients. If some services could be rescheduled for the afternoon (as is actually done in a few centers), it is very likely that more patients would be attracted and that their attitude toward the center would be more favorable. In El Salvador, the semiprivate

Botón Azul, which offers prenatal service from 7 p. m. to 9 p. m., is an obvious success, as its crowded waiting room attests.

The Privy Problem

The humble pit privy may also be used to illustrate the importance of understanding the general cultural configurations of a country. Privy campaigns probably have been carried out in all Latin American countries. Public acceptance in some instances has been good, but all too often privies have been used as chicken coops or as grain silos. Customary posture in defecating is perhaps the single most important fact which bears on the acceptance or rejection of privies.

A coffee planter in El Salvador, for example, built a series of privies, one for each house on his plantation, according to the standard American "riser" model. He was upset when his employees refused to use them. Finally an old man offered the suggestion, "Patrón, don't you realize that here we are squatters?" The planter ripped out the seats, replaced them with a perforated slab floor, and was gratified to find that public acceptance was general.

In La Dorado, Colombia, *Servicio*-built privies appeared to meet all cultural specifications, but were not well accepted. The anthropologist found that an important factor was the belief that bad odors in themselves are carriers of infection and causes of illness. Many people felt they were observing good hygiene in not using privies.

BASIC CULTURAL FACTS

Since greatly increased attention is being given to cultural factors in the planning and operation of public health programs, some of the general theoretical implications of the work done by the anthropologists who participated in the survey may be mentioned. Foremost among these is the question of how much an administrator must know about a given culture in order to carry out a specific project. Ideally, the more he knows about the cultural milieu in which he operates or proposes to operate, the more successful he will be.

It is axiomatic with anthropologists that culture is an integrated, functional whole, in which the separate parts continually impinge upon each other, conditioning and governing, and in turn being conditioned and governed. A change in one part of a culture will produce secondary and tertiary disturbances in other parts, or the primary change may be difficult to induce because of limiting circumstances surrounding adjacent areas of culture.

In Latin America, the success of public health programs is to a very considerable extent dependent on corresponding advances and modifications in a number of other aspects of the culture. These embrace technological devices, systems of social and political organization, and attitudes and values. Bodily hygiene, for example, is more than a question of education and persuasion. It implies the presence of pure water in reasonable quantities—a system of piped water in most instances. But a modern water distribution system requires a maintenance organization, tools and replacement parts, power for pumps, and a sociopolitical structure to administer the system, collect bills, and provide personnel. Improved bodily hygiene, therefore, requires new mechanized devices, new technical knowledge, new attitudes, and new systems of cooperation. The individual who operates on the assumption that a superior idea or technique alone will attract supporters, regardless of the cultural context into which it is introduced, will encounter many frustrating experiences.

Primary Social Data

Although it is desirable to know as much about a culture as possible, there are obviously strict limitations as to what can be known. Social scientists have barely made a beginning in the formidable task of describing the elements of the cultures of the world and interpreting their significance. It must be assumed that for any given program there are certain categories of information about the culture in which the work is to be carried out which are of primary importance, and others that are of lesser importance. A "trial run" in compiling a list of primary classes of data for public health programs gives the following picture.

The points mentioned are suggestive and illustrative and do not pretend to be a definitive catalog.

Folk medicine and native curing practices. The significance of these data has been discussed.

Economics, particularly incomes and costs of living. The cited case of failure to build privies because of their relatively high cost indicates the importance of this aspect of the culture. Inability to pay for medicine is one reason why many persons fail to avail themselves of treatment at the health center. The possibility of achieving a balanced diet is also restricted by inability to pay. Inadequate housing is a great problem in many parts of Latin America. Since in the final analysis the success of public health programs rests upon major changes in the habits of people with respect to diet, housing, clothing, agriculture, and the like, knowledge of the economic potential of an area is paramount.

Social organization of families. In Xochimilco, Mexico, for example, a bride often lives in her husband's home, under the domination of her mother-in-law. A number of cases were noted in which pregnant women failed to follow, or had difficulty in following, health center recommendations because these conflicted with what the mother-in-law thought was best.

Men and women who live together are frequently not legally married. Under such circumstances, a man is less likely to recognize obligations to his companion and their children, and it is therefore more difficult to persuade him to come to the health center for venereal or other treatment. Recognition of these and similar problems makes the responses of patients more intelligible.

Education and literacy. Ability to comprehend the real nature of health and disease, to profit by health education, and to understand and follow the physician's instructions depends on the education and literacy of the people.

Political organization. Local conditions under which physicians and other staff members are appointed, bureaucratic rules which govern operations, and the like, are factors which will affect public health programs. In one country, for example, a large health center, not yet placed in operation, was seriously threatened by the conflicting interests of the state gover-

nor, the local nurses' union, and other bureaucratic factors.

Religion. A basic analysis of religious tenets is not essential, but some parts of the religious philosophy of the people should be known. Are there any beliefs which hinder or directly conflict with proposed programs? Is death, for example, at any age considered a welcome relief from a world of suffering? Are there food taboos based on religious sanction which should be taken into consideration in planning diets?

Basic value system. What are the goals, aspirations, fundamental values, and major cultural premises, consciously or unconsciously accepted, which give validity to the lives of the people in question? What is the practical significance, for example, of a fatalistic approach to life and death? What part does prestige play in determining customary behavior patterns of the people? Is male vanity and ego a factor to consider? What are the ideas of bodily modesty? What are the types of stimuli and appeal to which people respond most readily?

Other types of data. Planners and administrators of public health programs should also have at hand such information as credit facilities and money usages, labor division within the family, time utilization, working and eating schedules, cooking and dietary practices, and the importance of alcoholism.

Categories of culture in which precise knowledge would appear to be of lesser importance include agriculture, fishing, and other primary productive occupations, industrial techniques (except as working conditions may affect health), trade and commerce, religious fiestas and church observances, wedding ceremonies, burial customs, and music and folk tales.

Use of Social Science Data

Specific health programs should be projected against basic data, decisions made as to what specialized additional information is needed, and plans made to gather such information.

For some parts of the world, considerable quantities of these basic or "core" data are available. Latin America is such an area. The

anthropologists who made this analysis were working in a field in which a great deal of preliminary, pertinent work had been done. Anthropologists, and to a lesser extent sociologists, have for more than 20 years been quietly gathering, analyzing, and publishing data on Latin American cultures. Much of this work was done with no thought of immediate practical application. Nevertheless, it represents a large stock of accumulated scientific "capital," much of the value of which lies in the fact that it is generalized and not specialized, and therefore affords a workable background for the institution of a wide variety of programs.

The discovery, classification, and interpretation of new facts merely points the way to continuing research. Simultaneously, however,

this process makes possible the solution of technical problems of steadily increasing complexity and variety, and consequently of expanding utility in the practical or applied context.

Therefore, one of the best uses of the social sciences in the bilateral health programs of the Institute of Inter-American Affairs is the direct assignment to field parties of individuals well versed in the most recent developments in their fields, both to do generalized cultural research and to gather specialized information to facilitate specific projects. Such a plan would make it possible for administrators and program planners to have a continually growing body of precise factual information which, judiciously utilized, would eliminate much of the guesswork which otherwise cannot be avoided.

CIRCULARIZATION

Of PHR Free Mailing List

Early in October *Public Health Reports* will send a mailing list circularization inquiry to all addresses on its official and free mailing lists—not, however, to paid subscribers.

Required by the Joint Congressional Committee on Printing, this circularization necessitates return of a special card confirming correctness of the address and number of copies of *Public Health Reports* sent each month. Health departments, teaching institutions, libraries, and others will want to devote special attention to the circularization inquiry, as the mailing list is composed for the most part of office and position titles, rather than of individual names.

Watch for the special postal card. Complete it fully and return it promptly. Failure to respond by the date specified on the card sent each addressee will result in removal of the name from the mailing list.

Polluted Air, a Growing Community Problem

By HENRY N. DOYLE

Can we achieve that to which every citizen is entitled: an atmosphere of reasonable cleanliness? This review of some of the constructive efforts which communities in the United States are making to study and control the ever-increasing problems of air pollution gives hope that we can learn to manage the great sewer that is the atmosphere.

AIR POLLUTION, the most complex problem facing the environmental hygienist, has been with us ever since man began to use coal as fuel. As technology advances, the problem becomes more acute. In the past, the hygienist hesitated to tackle it because he lacked the necessary equipment to measure the effects on man or to measure the microquantities of contaminants in the atmosphere. Nor was there any general demand for action since the public had customarily associated industrial stack discharge with prosperity.

In recent years, however, the 1948 smog disaster in Donora, Pa., and the growing significance of the Los Angeles air pollution problem have changed the public's attitude from apathy to anxiety. Some measure of this change has been evident in the requests the Public Health Service receives for information on air pollution, a negligible number prior to 1940. Each year sees a significant increase in their volume. In addition, during the past 5 years,

25 cities have requested investigations similar to the one made in Donora by the Public Health Service.

Industry, as well as government, is keenly aware of the growing interest of the public in atmospheric pollution and its health and economic implications. Many millions of dollars are being spent by both for research and correction. Industry itself is spending an estimated \$120 million a year to control air pollution. Even so, few experts believe that in the foreseeable future our cities will have "country fresh" air. Air pollution is a penalty of our modern way of life, and, unless we wish to pay exorbitant prices for certain commodities, we may have to tolerate a certain degree of atmospheric pollution for years to come.

The public in general fails to realize that the atmosphere is the world's greatest sewer. All organic waste, industrial or otherwise, must finally be discharged into the air either directly, through combustion, or by disintegration. Technology, however, in many cases can alter the chemical composition of industrial and domestic organic compounds so as to make them innocuous. In the past, we have used the atmosphere to disperse much of our inorganic waste over large areas. This type of pollution can be prevented with modern dust collection systems and electrical precipitators. Such control measures are costly, however, and they can-

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not be expected to be put in general use in the absence of either restrictions or economic advantages.

The effects of atmospheric pollution on people may be arbitrarily divided into four major categories: effects on human health and comfort, toxic effects on animals and vegetation, economic damage, and loss of natural resources.

Health Effects

The effect on health of chemical air pollution has been a controversial subject ever since the use of coal was banned in England during the thirteenth century because of the alleged injurious effects of coal smoke. Current scientific literature is replete with allegations concerning the harmful effects of chemical air pollution. Investigators have attempted to correlate an increasing incidence of respiratory and chronic diseases and an ever-rising rate of lung cancer with the increased severity of pollution. However, in many cases the investigator has been able only to implicate air pollution because of other corresponding and determining factors such as housing, income, nutritional status, and intelligence levels.

A study of the possible relationship of smoke to increased mortality is now under way in England in connection with the recent record fog. Following the 4 days, December 5 to 9, 1952, in which the greater part of metropolitan London was continuously enveloped by a smoke-laden fog, a spectacular rise in deaths occurred.

During this period, abnormally large numbers of persons of all ages died from causes associated with respiratory difficulty. This was similar to what had happened immediately after a comparable fog in 1873, but the death rate in 1952 was much greater and was, in fact, as great as that during the worst week of the last cholera epidemic. Exceptionally high concentrations of smoke and sulfur dioxide were recorded. The highest average concentration was 4.46 mg. of smoke per cubic meter of air and 1.339 parts of sulfur dioxide per million parts of air (1).

Although there are no large metropolitan areas in the United States which suffer extended periods of smoke-laden fogs, significant smogs do occur in certain industrial areas. Largely

because of the enormous difficulties in obtaining reliable data, epidemiological investigations have not been made in these communities. The field of the chronic effects of smog on health thus remains relatively unexplored. Nonetheless, despite the absence of any clear-cut etiology, it is difficult to ignore the vast mass of indirect evidence on chronic effects.

The acute effects of air pollution have been easier to substantiate. Conclusive proof has been afforded by three recorded episodes in which large masses of people were affected. These involved the Meuse Valley, Belgium (2), Donora, Pa. (3), and Poza Rica, Mexico (4). In the Meuse Valley (1930), 60 persons died and several thousands were made ill. In Donora (1948), 20 persons died and some 5,000 were affected in varying degrees. In neither case was the causative agent specifically identified. Most authorities agreed that a combination of contaminants was responsible. A large concentration of industry in a narrow valley and the occurrence of unfavorable weather conditions were circumstances common to both episodes.

The Poza Rica incident (1950), in which 22 persons were killed and 320 were hospitalized, was due to the accidental release of hydrogen sulfide to the atmosphere, which resulted from the failure of mechanical equipment in a sulfur recovery plant. This incident, however, should be classed as an accident since similar possibilities exist wherever large volumes of toxic gases are being processed or transported.

Other isolated incidents affecting numbers of people have also been reported. In one small industrial city, a beryllium manufacturing plant had since 1943 been discharging into the community atmosphere certain beryllium particulates that by 1951 gave rise to 16 cases of chronic beryllium poisoning. Five of the persons so affected have died. Because of the radial distribution of the cases, the source of the poisoning was unmistakably traced to the beryllium plant (5).

To our knowledge, such occurrences are rare. When detected they can be controlled through education, or, in the instance of a recalcitrant industry, by means of local law. Unfortunately, however, health authorities do not always have complete information regarding

the location of plants manufacturing or processing dangerous and toxic chemicals.

In contrast to infrequent acute health effects, sensory discomforts are well recognized by all persons who have had any contact with air pollution in major metropolitan centers. Obnoxious contaminants include those substances which irritate the eyes or nasal passages and those which have a distinct and often irritating odor. The atmosphere in Los Angeles has been particularly affected by lachrymators which cause frequent sensory disturbances. Although these materials have never been proved to be injurious to health, they certainly do not contribute to a sense of well-being.

Toxic Effects

While some of the alleged chronic effects of air pollution on human beings may be difficult to prove conclusively, there is unmistakable evidence that pollutants influence the growth and development of animals and plants. Animals have become sick from eating vegetation which has been contaminated with fluorides from the stack discharges of certain industrial plants. As a result, the teeth of grazing animals in fluorine-polluted districts have been known to deteriorate so much that the animals were unable to feed. Advanced fluorosis in these animals has been associated with such symptoms as lameness resulting from bone lesions, reduced feed consumption, emaciation, diarrhea, decrease in production, and lowered breeding efficiency (6).

The Public Health Service's investigation of the Donora smog incident, which was characterized by a combination of pollutants, revealed that an appreciable number of domestic animals became ill, and some died. Dogs appeared to be the most susceptible, both as to morbidity and mortality.

Air contaminants may also harm plant life. They may discolor crops and reduce yield. Acid gases in the atmosphere may scorch leaves and young plants beyond recovery and may sour the soil. In some industrial areas, there are no crops, gardens, or vegetation because of the harmful effects of air pollutants.

Sulfur dioxide from smelting and other in-

dustrial operations adjacent to forest regions has had a pronounced detrimental effect on tree growth. Continued absorption of atmospheric sulfur dioxide has been known to reduce conifers, which normally maintain their needles for 3 years or longer, to only the current year's growth of needles. Other important atmospheric contaminants which can cause injury to vegetation include hydrogen fluoride, sulfuric acid aerosols, and certain unidentified organic compounds.

Economic Damage

Annual direct losses from air pollution in the United States are estimated as amounting to at least \$1.5 billion, or about \$10 per capita (7). A large part of this loss obviously is caused by damage to or destruction of vegetation. In 1950, for example, approximately \$300,000 worth of leafy vegetable crops alone were damaged by smog in the Los Angeles area (8). Contributing to the total expense is damage to property, including the discoloration and disfiguration of buildings. Corrosive acid gases in the atmosphere eat away stone, mortar, and metals. It has been reported that sheets of galvanized iron had a life span of 3-6 years in Pittsburgh as compared with 7-14 years in a smoke-free community and that copper would last only 10-20 years in Pittsburgh, whereas it would last indefinitely where there is relatively little atmospheric pollution.

The interiors of buildings are also subject to soiling and corrosive action on walls, rugs, draperies, linens, and clothes. Replacements must be made frequently. Soap, laundry, and dry cleaning bills are increased, adding to the household living costs. The Mellon Institute of Industrial Research estimated that in 1913 over \$2 million was spent in Pittsburgh on extra laundry and dry cleaning of clothing soiled by soot; another \$75 million was spent on cleaning and renewal of wallpaper and curtains.

There is a loss of merchandise in stores. Polluted atmospheres also cut down the normal amount of sunlight. More artificial lighting is needed, thus increasing the cost of illumination. Air contaminants may even force people to move to another community, thus causing a drop in real estate values.

Loss of Natural Resources

A further loss by air pollution lies in the large tonnage of valuable materials emitted into the atmosphere. The Mellon Institute estimated that in 1926 about 160,000 tons of nitrogen were lost in smoke from soft coal used in American households. This amount was equal to nearly half the inorganic nitrogen used that year in the United States. Although this nitrogen would not be recoverable, it serves to illustrate the magnitude of losses by industrial processes.

According to the United States Bureau of Mines, 700,000 tons of manganese, representing approximately 50 percent of our yearly requirements of this critical commodity, could be recovered annually from processing losses. Among the rare metals, germanium, gallium, rhenium, and selenium are being lost in flue dusts and smelter discharges; recovery processes are yet to be developed. Great Britain is reported to be dissipating yearly in coal ash 1,000 tons of gallium and 2,000 tons of germanium into the air (9).

The economic value of reclaiming substances previously discharged into the atmosphere may be illustrated by the experience of the Canadian smelter which formerly caused crop damage in the State of Washington. The smelter now uses its sulfur dioxide in the manufacture of fertilizer. As a result, the returns to the smelter from this operation exceed the value of its smelting operations.

Major Studies

Until relatively recently, measurements of the degree of air pollution consisted of fall-out studies in which concentrations were expressed as tons per square mile of surface. Such studies were helpful in demonstrating that, in many highly industrialized areas, the dust-fall amounts to hundreds of tons per square mile per year. This system of measurement, however, failed to identify the contaminant and gave no index of the diurnal variation. Consequently, it had critical shortcomings as an aid to effective abatement and control of air pollution. With recent progress in instrument development, the chemist is now able to evaluate both quantitatively and qualitatively the atmospheric particulate matter and certain of the gases. Concentrated research, though, remains

Table 1. Concentration of metallic elements urban atmospheres in micrograms per cubic meter of air

Element	Average values		
	Detroit	Windsor	Charles
Silicon.....	3.5	6.4	8.
Aluminum.....	3.2	3.0	2.
Iron.....	3.0	2.8	.
Calcium.....	2.5	7.8	1.
Magnesium.....	.6	.9	.
Lead.....	.4	.7	.
Zinc.....	.4	.3	Abs
Manganese.....	.2	.3	.
Copper.....	.05	.4	.
Titanium.....	.05	.1	.
Tin.....	.04	.06	.
Molybdenum.....	.03	.05	.
Barium.....	.01	.07	.
Cadmium.....	.01	.006	.
Chromium.....	.008	.02	Tr
Nickel.....	.006	.03	Tr
Antimony.....	.005	Absent	Abs
Vanadium.....	.002	.009	Tr
Cobalt.....	.001	Trace	Abs
Beryllium.....	.001	.002	.

to be done on the isolation and identification of certain materials, particularly the hydrocarbons and other organic compounds, which exist in the atmosphere in trace amounts.

A number of studies of various air pollutants have been made in major industrial areas. Table 1 shows an analysis of the metallic constituents of the atmosphere in three cities: Detroit, Windsor (Ontario), and Charleston, W. Va. (10). In each instance, the same methods of sampling and spectrographic analysis were used. It is evident that certain elements such as iron, calcium, magnesium, and silicon constitute the bulk of the metallic elements (80 to 90 percent). It will be seen in table 1 that the elements below manganese generally occur in amounts less than 0.1 microgram per cubic meter. In comparison with the predominant metals, those of lower concentrations—manganese and below—are commonly considered to be more toxic. This uniformity of findings, if substantiated by further study, is of great importance in that it indicates a common problem in large and diversified industrial areas.

An interesting comparison of the area distribution of certain elements in Detroit and

Cincinnati is shown in table 2. As might be expected, there is an increase in the total particulate atmospheric load as one moves from the residential section to the center of the industrial area (11). Organic matter constitutes the major portion of air contaminants, since the metallic elements comprise only from 5 to 11 percent of the total weight. According to some authorities, the bulk of the organic matter is considered to be gasoline combustion products, organic chlorides, ketones, aldehydes, and organic acids.

Table 3 illustrates the concentration of some organic constituents found in the Los Angeles area (8). Insufficient work has been done to determine whether or not a common pattern of organic constituents exists in other areas.

In an air pollution study conducted in Salt Lake City in 1951, the contaminants were collected by electrostatic precipitation rather than by filtration, were accumulated for the duration of the study, and were chemically analyzed. Table 4 illustrates the inorganic constituents according to their relative proportions. Here again is evidenced the same general order of the metallic elements as was found in Detroit and Charleston. The only exception is silicon, which, in this case, dropped from 1st to 6th place. Despite the fact that Salt Lake City is a nonferrous smelting center, the order of the metallic elements is almost identical to that for the Detroit area where the industries are primarily ferrous in nature.

The accumulated material from the Salt Lake City study was split into benzene soluble and insoluble fractions. The benzene soluble and combustible fraction constituted 22 percent of the sample and was assumed to consist of tars and hydrocarbons; the benzene insoluble and combustible fraction (48 percent of the sample) was assumed to be soot and insoluble tars. The difference (30 percent of the sample) was ash or inorganic matter. Comparable data on the organic fractions for other areas are not available. Photomicrographs of the particulate matter collected during the Salt Lake City smog of November 28, 1950, are shown in figure 1.

Weather conditions greatly affect the concentration of atmospheric contaminants. In the Cincinnati study (11), it was found that the concentration of the particulate matter was greater in the winter months by a ratio of almost 2 to 1; whereas the number of particles present in the atmosphere increased by a ratio of almost 4 to 1. As is evident in table 3, the degree of contamination by the gaseous material in Los Angeles is much greater on days of reduced visibility than on days of good visibility. The same observation may be made for the particulate matter. For instance, the concentration of all the contaminants, except formaldehyde, shown in table 3 increased by a factor between 5 and 6; the formaldehyde concentration was only doubled. Other studies done in Los Angeles have proved that days of

Table 2. Concentration of certain elemental constituents in the atmosphere of Detroit and Cincinnati, according to district

Element	Average values in micrograms per cubic meter of air					
	Residential		Semi-industrial		Industrial	
	Detroit	Cincinnati	Detroit	Cincinnati	Detroit	Cincinnati
Iron.....	3.0	6.0	5.4	7.7	7.4	12.7
Aluminum.....	3.8	2.2	4.6	4.0	5.0	5.3
Silicon.....	2.6	-----	3.7	-----	4.1	17.7
Calcium.....	4.3	-----	4.3	-----	3.6	5.2
Lead.....	.6	1.0	1.0	2.0	.9	3.7
Zinc.....	.2	1.6	.4	1.3	.7	2.0
Manganese.....	.18	.2	.23	.4	.3	.4
Copper.....	.11	2.0	.13	.8	.2	1.2
Tin.....	.03	.1	.04	.1	.04	.1
Total concentration of all pollutants.....	184	191	279	344	381	472

Table 3. Concentration of pollutants in the Los Angeles atmosphere; maximum values as measured over downtown Los Angeles on various days

Pollutant	Concentrations (in ppm) by volume	
	Day of good visibility	Day of reduced visibility
Acrolein.....	(¹)	Present
Lower aldehydes.....	0.07	0.4
Carbon monoxide.....	3.5	23.0
Formaldehyde.....	.04	.09
Hydrocarbons.....	.2	1.1
Oxidant.....	.1	.5
Oxides of nitrogen.....	.08	.4
Ozone.....	.06	.3
Sulfur dioxide.....	.05	.3

¹ No quantitative method is known for measuring low concentrations of acrolein.

reduced visibility correspond with certain meteorologic conditions, especially temperature inversions.

Figure 2 illustrates the effect of inversions on the intensity of the Salt Lake City smog. On February 8, 1951 the atmosphere was thermally normal or unstable whereas on February 15, an inversion existed, resulting in atmospheric stability. On both days the wet bulb temperature and wind velocity and direction were of the same order of magnitude. Relative humidity was 55 percent on February 8 and 80 percent on February 15.

From the foregoing, several conclusions may be drawn:

The atmosphere is a great receiver and diluter of civilization's waste products.

It is suspected that there is a relationship between air pollution and certain chronic illnesses in humans although this has never been definitely proved. There is no doubt, however, that under certain combined topographic and meteorologic conditions, acute illness and death in man may occur.

Certain atmospheric pollutants when present in sufficient concentration have definite toxic effects on animals and vegetation.

Atmospheric pollution causes great economic waste and a loss of valuable mineral resources.

There appears to be a remarkable similarity

in the qualitative pattern of the inorganic pollutants in large industrial areas which have climatic and industrial resemblances.

Contaminants are largely organic in nature, but insufficient information is available on the organic constituents to conclude that there is a similarity in the organic contaminants in industrial areas.

The degree of pollution in any area is affected by seasonal and meteorologic variations.

Governmental Activities

There is no legislation governing air pollution on the Federal level although several bills have been introduced into Congress to give Federal agencies, chiefly the Bureau of Mines and the Public Health Service, authority to engage in certain research aspects of the problem. Major Federal activity in the field of air pollution in recent years has been confined to a comprehensive investigation of the Donora disaster by the Public Health Service. Currently, at the request of the International Joint Commission of the United States and Canada, a study transcending international borders is being conducted in the Detroit-Windsor area by the Public Health Service and the Canadian Government (12).

At present, almost every State and local in-

Table 4. Metallic elements in Salt Lake City smog

Element	Percent of total sample
Aluminum.....	2.5
Calcium.....	2.0
Iron.....	2.0
Magnesium.....	1.0
Lead.....	.7
Silicon.....	.4
Copper.....	.4
Zinc.....	.2
Manganese.....	.1
Tin.....	.06
Titanium.....	.04
Molybdenum.....	.03
Nickel.....	.02
Chromium.....	.01
Antimony.....	.01
Arsenic.....	.01
Barium.....	.01
Cobalt.....	.01
Vanadium.....	.01

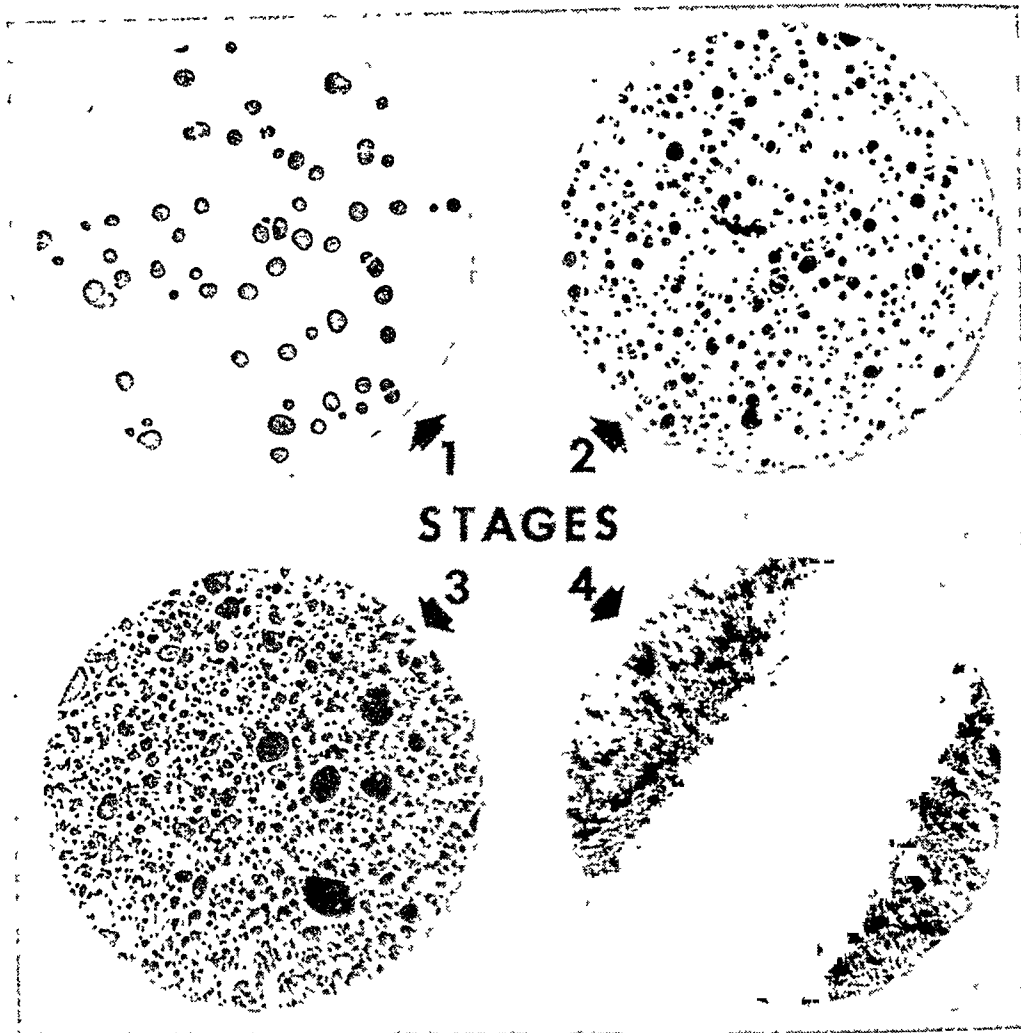


Figure 1. Photomicrographs (magnification 100 \times) show the particulate matter collected by a cascade impactor in the fall of 1950 during a Salt Lake City smog. The impactor separates and collects atmospheric particles according to size. Stage 1 shows the larger particles. Stages 2 and 3 show the intermediate size particles—the larger ones visible are probably due to impaction and coalescence. Stage 4 shows the smaller particles.

dustrial hygiene agency is engaged to some extent in air pollution studies. Industrial hygiene agencies are well qualified for such activities because of their experience and knowledge in dealing with a wide range of airborne contaminants. In many instances, they have had to assume this responsibility at the expense of their regular activities.

Pennsylvania is among the States with a full-scale air pollution program. Since early in 1949, when the Pennsylvania General Assembly authorized funds for the study of the problem, an air pollution unit has been operating within the bureau of industrial hygiene of the Pennsyl-

vania Department of Health. The staff studies technical phases of air pollution problems, conducts investigations wherever necessary, and assists communities in the evaluation of local problems. The air pollution unit is fully equipped with testing apparatus and meteorologic equipment and has a mobile laboratory and apparatus for the determination of atmospheric sulfur dioxide concentrations.

In Maryland, air pollution control constitutes an important activity in the divisions of industrial hygiene of the State Department of Public Health and the Baltimore City Health Department. While specific air pollution legislation

has not been passed, the State legislature has appropriated moneys for this work for the past 3 years. Activities of the State unit have generally been confined to investigating local problems created by specific industries. To facilitate its work, the State has available a mobile laboratory and testing equipment. Requests for assistance with air pollution problems have been particularly numerous in Baltimore. During the 1952-53 fiscal year, 70 percent of the 230 complaints received by the Baltimore industrial hygiene unit dealt with community air pollution.

In New Jersey, too, the bureau of adult and industrial health devotes much of its time to air pollution problems. The bureau not only investigates complaints, but also engages in research on methods of sampling. At the same time, it is attempting to bring about a better understanding of the problem by the general public. The bureau is presently conducting a study of the highly industrialized Perth Amboy area. This study is an excellent example of how a State can plan and initiate an air pollution study and maintain the confidence and support of both the public and industry.

The West Virginia division of industrial hygiene recently completed a study in the Greater Kanawha Valley industrial area, which was requested by an industry and citizens' advisory committee, and industrial groups contributed \$25,000 to help defray a large part of the cost. The Kettering Laboratory and Institute of Industrial Health assisted in the technical study, and the Public Health Service gave consultant services. The study clearly defined a need for continuing studies and for a long-range plan based on technical principles that would enable the best control possible within the limits of sound economy. The report also emphasized a need for uniform, accurate, and continuing records of emissions to the atmosphere by industry.

The Oregon Legislature in 1951 established an Air Pollution Authority as a part of the State health department. The authority is directed to investigate the extent and magnitude of air pollution in the State and to develop a comprehensive program for the prevention and control of all sources of air pollution.

Air pollution activities are more prevalent on

the local level. Many large cities, including Los Angeles, New York, Cleveland, Detroit, and St. Louis, have recognized that smoke control is but one aspect of the air pollution problem and, in addition to previously existing smoke abatement units, have established air pollution control units. Most of these city units are policing agencies, which base their actions on sound technical studies and reasonable standards.

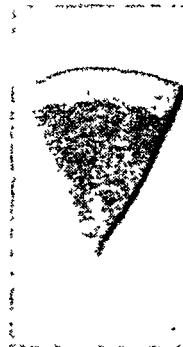
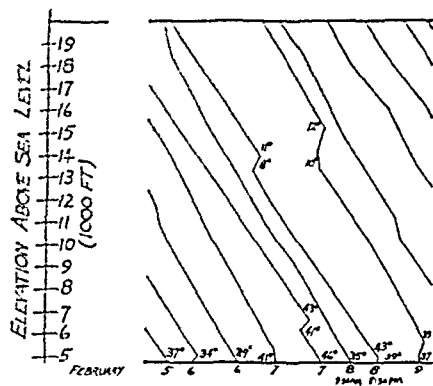
The activities reviewed above are but a few examples of the air pollution work being conducted by various States and municipalities. They are intended only to depict the diversity of activities and illustrate different methods of approach.

Various private agencies have also been active in the field of air pollution. Particularly noteworthy is the fine work being done by the Kettering Laboratory and Institute, the Battelle Memorial Institute, the Industrial Hygiene Foundation, the Lake Carriers' Association, the Manufacturing Chemists' Association, and many universities as well as numerous other organizations. We look to these agencies to develop better equipment for air pollution control and to bring about a better understanding of the problem on the part of industry and the public.

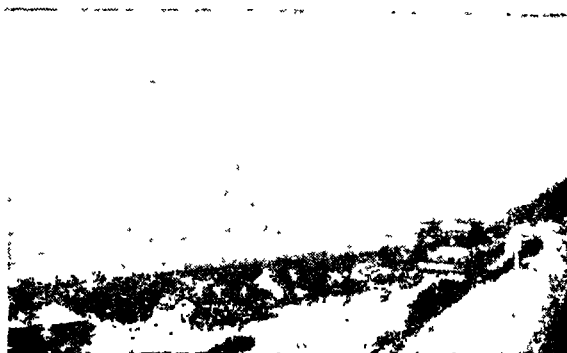
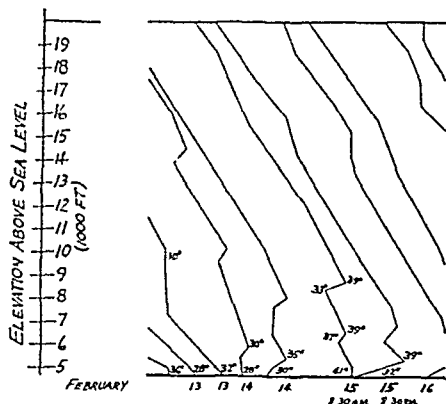
The Job Ahead

Air pollution is not an insolvable problem. However, its solution is going to require patience, persistence, research, and a mutual understanding among the public, government, and industry. Each can and must play a definite part in bringing about cleaner air for our towns, cities, and metropolitan areas.

The public must realize that it is a part of a modern technologic society and that its continued high standards of living call for full industrial production. The average man must further realize that he too is a contributor to air pollution because of his automobile, his backyard incinerator, and often, because his home heating system is inefficient. The impact of chemical air pollution on our health and resources has been manifested for only a relatively short period. Given sufficient time, the problem can and will be solved. It is not meant to imply, however, that in the meantime a citizen should stand idly by and possibly have his



February 8, 1951



February 15, 1951

Figure 2. Illustrations of effect of inversion on smog intensity in Salt Lake City, February 8 (top row) and February 15 (lower row). The graphs show aerological soundings—note inversion on February 15. Next are filter paper samples (volume 450 cubic feet) of smog stain—the February 15 sample is almost black. The difference in visibility on the two days is emphasized by the identical views overlooking the Salt Lake Valley.

courage new industry or industrial expansion. Those industries which are already in the community should be expected to abide by reasonable rules and regulations which have been found to be effective in other areas. Persuasive methods should be used to secure self-initiated corrections on the part of industry. At the same time, the community should realize that it too is quite often a violator of good municipal air pollution standards by virtue of burning trash heaps, allowing the operation of inefficient boiler plants in municipal power generating plants, and permitting inadequate regulations controlling the type of fuel and combustion plants for private homes, apartments, and office buildings.

Industry must adopt the good neighbor policy. A community cannot tolerate a dominant industry. For an industry to be successful, it must learn to live in complete accord with the inhabitants of the community. In selecting locations for future industrial sites, industry must not only consider such items as transportation, availability of raw materials and labor, but it must also add new criteria: topography and meteorology. If toxic chemicals are to be discharged into the atmosphere, it must locate where meteorologic conditions are conducive to the favorable dissemination of smoke and other contaminants unless adequate control of pollutants is assured. Industry must also appraise its stack effluents. It must assure that highly toxic compounds such as beryllium are controlled within narrow limits. This may in some cases necessitate studies to determine the toxicity of new compounds and those metals which have recently gained industrial significance.

Because of the magnitude and complexity of the air pollution problem, the solution must obviously lie in concerted action. An individual industry can rarely afford to engage in specialized toxicologic studies of suspected harmful contaminants. It must therefore draw upon the resources of universities, research foundations and other private organizations, and government. Furthermore, it must accept the community as a partner in a jointly recognized and accepted effort to cleanse the atmosphere of excessive and harmful contaminants. With such a spirit of mutual confidence and unity, we shall be able to cope with the problem

before a threatened saturation impels desperate action as in water pollution. Indeed, there is every hope and reason that we can achieve what every citizen is entitled to: an atmosphere reasonably free from chemical pollutants.

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Efficient Domestic Stoves

Most of the coal used domestically in 1948 (37 million tons) was burned in open grates and kitchen ranges of traditional design and low efficiency. Although about half the present domestic consumption of coal could be saved by its more efficient use, a very much smaller saving would, no doubt, be effected since the greater efficiency of the newer appliances would be used to provide greater comfort for the same fuel outlay.

Within recent years, many manufacturers have made successful efforts to design more efficient fires and stoves for domestic heating. The Fuel Research Station of the Department of Scientific and Industrial Research has tested many of these appliances, and the Minister of Health in consultation with the Minister of Fuel and Power and other Government departments has issued a list of approved appliances.

The sale of these newer and more efficient appliances has greatly increased since the end of the war. Increasing attention is being paid to improving the insulation of houses so as to conserve heat and so to reduce the amount of fuel used.

Fuel-Saving in Industry

It is in industry, perhaps, that the greatest strides have been made in the more efficient use of fuel, especially in the generation of electricity which now requires about 30 million tons of coal a year. In 1921, 1 kilowatt-hour of electricity required 3.4 pounds of coal; now, only 1.4 pounds is needed.

During the war, in order to eliminate from merchant ships the telltale smoke plumes that occurred soon after firing, the Fuel Research Station designed smoke-eliminator doors for the furnaces. These provided the extra secondary air when it was needed. This principle has now been extended to the design of smoke-eliminator doors for a number of shell-type boilers.

The Ridley Report

The recent report of the Committee on National Policy for the Use of Fuel and Power Resources (the Ridley report of 1952) is most

germane to this issue of fuel efficiency and smoke abatement. It makes the following recommendations:

Development of more efficient types of open fires to burn coal more efficiently and smokelessly.

Increased use of gas for domestic heating during peak loads on electricity generation.

Expansion of the fuel-efficiency advisory service.

Financial incentives to firms installing efficient equipment for combustion.

Prior approval for industrial and commercial heating plants.

More training schemes for stokers.

Replacement of steam railway locomotives by other types.

Wider use of low-temperature carbonization for production of smokeless fuels.

More general adoption of smoke abatement bylaws under the Public Health Act of 1936.

More smokeless zones.

In Detroit



Detroit's present air pollution control program was started in 1947 when a committee of the Engineering Society of Detroit, at the request of the Department of Buildings and Safety Engineering, drafted a comprehensive air pollution control ordinance. Upon enactment of the ordinance, which replaced Detroit's smoke abatement ordinance, the Bureau of Smoke Inspection and Abatement was reorganized on an engineering control basis with a staff of 3 engineer administrators and supervisors; 17 air pollution inspectors; 5 office personnel; and 2 chemists, classified as industrial hygienists.

The air pollution control ordinance is enforced primarily by obtaining compliance. Court action is resorted to only for recalcitrants

By Benjamin Linsky, M.S.E., P.E., chief smoke inspector of the bureau of smoke inspection and abatement, Department of Buildings and Safety Engineering of the City of Detroit.

because, when a case reaches the courts, the bureau believes it has failed to "sell" the requirements of the community to the violator.

Control Alerting

Visible air pollution is controlled in Detroit by 15 district air pollution inspectors as well as by an observer for the bureau who dispatches two radio-equipped automobiles manned by air pollution inspectors. The observer watches for the sources of excessive air pollution, while they are active, from any one of several high buildings in different parts of the city. Citizen complaints are also served by the radio-equipped automobiles.

Measurements of "streetosphere" concentrations of pollutants are obtained to evaluate the need in a specific neighborhood for corrective work at a specific point source and to correlate such concentrations with various kinds of effects. Stack samples are obtained when it is necessary to evaluate air pollution emissions at the source.

Local industries and city departments operating large plants have been persuaded to engage in research and development when no technical controls for specific air pollution emissions were known. Examples of some recent and current projects are:

An intensive examination by the Chrysler Corporation of its problem of controlling dirtying particles from the continuous melt gray iron electric furnaces at its Dodge-Winfield plant.

The research by the city departments of public works and water supply into the problems of collecting dust particles from high-temperature gases at incinerator and sewage disposal plants.

The Aurora gasoline refinery's development of a neutralizer for odorous gases from a spent-caustic regenerator.

The over-fire air system of the Detroit Edison Company for reducing smoke from its large multiple-retort-stoker-fired steam generators.

Results Over 5 Years

About \$14 million has been spent for installations of direct air pollution control in 5 years.

This sum is for corrections required by violation notices from the bureau and does not include the large number of equipment changes made where installation permits were not necessary.

Horizontal visibility, in the absence of rain, fog, snow, or sleet, has increased measurably. Dustfall in industrial areas has been reduced.

More than 140,000 tons of fly ash a year is now being caught in fly ash collectors. Large tonnages of chemical and other dusts are also being caught. Emissions of industrial gases such as hydrogen sulfide and hydrofluorosilicic acid have been reduced.

Smoking chimneys are fewer and less frequent. A white shirt can be worn a full day. Fly ash does not accumulate along curbs and in store doorways.

Cooperative Control Efforts

The Bureau of Smoke Inspection and Abatement engages in limited research work, when no industrial sponsorship can be obtained. It freely exchanges ideas with other air pollution specialists in public agencies and in private industry. Its activities are deliberately and conscientiously integrated with related local agencies. Thus, the planning and zoning agencies are sources of reports of neighborhood problems as well as recipients of technical air pollution data and recommendations from the bureau. The bureau works continuously on improved air pollution instrumentation in cooperation with the division of industrial hygiene of the health department.

Similarly, solutions to air pollution problems which involve fire hazards are worked out cooperatively with the fire department. The local water pollution control agency is consulted about wet methods of air pollution control. Health effect determinations made by the health department guide the bureau's engineering control work.

There is still another relationship between the bureau and the Detroit Department of Health. To avoid duplication of specialized laboratory facilities, special sampling instruments and the two industrial hygienists in the bureau are stationed in the laboratory of the industrial hygiene division of the health depart-

ment. These men work under the direct supervision of the division, performing general industrial hygiene work with emphasis on air pollution sampling and analysis. When the bureau requires such measurements, the industrial hygiene division assigns men to work with the bureau's engineers and air pollution inspectors. The measurement data is then sent to the bureau for evaluation and use. Thus, in exchange the bureau is entitled to 2 man-years of air pollution measurement work per year from the industrial hygiene division.

Detroit-Windsor Study

As a byproduct of Detroit's request for abatement of the nuisance caused by smoke from ships plying the Detroit River, an international waterway, the Detroit-Windsor air pollution study of the International Joint Commission (IJC) of the United States and Canada was started. Recognizing parallel interests in various phases of the study, several local community groups in the Detroit area have contributed services, equipment, personnel, and funds.

The Detroit Edison Company erected pole supports and furnished high-volume filters. The Detroit Department of Health employs and supervises the health effects staff for the Detroit portion of the study. It also sponsored the stack-sampling course at the University of Michigan. The General Motors Corporation furnished all facilities for the joint industry conferences on the air pollution study.

The bureau pays the rent for the quarters of the United States section of the IJC Technical Advisory Board. The bureau serviced most of the high-volume filters daily and scheduled its Thomas autometer so that data could be coordinated with the IJC Technical Advisory Board's autometer. It also prepared detailed pollution source maps.

The area-wide Detroit-Windsor study will determine valid correlations between air pollutant concentrations and the effects on vegetation, corrosion, soiling, visibility, and health detriment. Already under way are a vegetation effects study and a pilot field study of health effects of urban air pollution in both Detroit and Windsor.

In Los Angeles



Comprehensive investigations on the causes and effects of air contaminants in the Los Angeles area show that, for the present, air pollutants can be related to such effects as reduction in visibility, eye and throat irritation, damage to vegetation, and local nuisance.

The Smog Mixture

Aerosols, gases, and vapors are the principal ingredients of smog in Los Angeles County. Dusts, smoke particles, and condensed fumes are obvious pollutants—detrimental because of physical characteristics causing reduction of visibility. The atmospheric oxidation of sulfur dioxide to sulfur trioxide and the formation of sulfuric acid mist contribute to this effect. Where atmospheric conditions provide time for the oxidation of certain hydrocarbons in the air, the polymerization of the oxidation products add to the haze. Droplets of organic acids and peroxides undoubtedly exist under certain moisture and temperature conditions. These, too, result from hydrocarbon reactions in the air.

The vapor or gas phase of smog is predominantly hydrocarbon. Olefinic, branched-chain, and cyclic compounds present in gasoline vapor are readily oxidized in the presence of sunlight and oxides of nitrogen to produce gases which are eye-irritating and damaging to vegetation. Ozone, a byproduct of the photochemical reaction, further aids the oxidation and leaves a residual ozone concentration which may reach nuisance proportions in the mass of polluted air. The Los Angeles studies have shown that the presence in the air of quantities of aldehydes, organic acids, and peroxides is largely accounted for by the reactions which occur.

Samples of the air taken under intense smog conditions in Los Angeles were analyzed by acceptable methods for identifying microquan-

By Gordon P. Larson (Lt. Col. Ret.), director of the Los Angeles Air Pollution Control District since 1949.

tities of materials. The results are shown below:

Aerosols	
Ether-soluble aerosols.	Lead.
Sulfuric acid mist.	Aluminum.
Carbon.	Calcium.
Silicon.	Iron.
Gases and Vapors ¹	
Acetylene.	Methyl chloride.
Aromatics.	Nitric oxide.
Benzene.	Nitrogen dioxide
Isobutane.	Nitrous oxide.
n-butane.	n-pentane.
Butenes.	Phosgene.
Carbon tetrachloride.	Propane.
Ethane.	Propylene.
Ethyl benzene and/or xylene.	Sulfur dioxide.
Formic acid.	Toluene.
Methyl Cellosolve	Trichlor ethylene.
Unsaturated hydrocarbons ranging from C_2H_4 to $C_{12}H_{24}$.	
Products of oxidation of the above unsaturated hydrocarbons (aldehydes, peroxides, ketones, and organic acids).	

¹ In addition to normal gaseous constituents of the atmosphere.

The aerosols are listed in order of importance as they affect visibility, which has been determined by a relative pollution index.

Results of Controls

Control efforts in Los Angeles have been highly gratifying. Over 600 tons of air pollutants once discharged daily into the atmosphere are now being withheld. Industry accomplished this by spending over \$12.5 million for control equipment.

Valuable sulfur is recovered by the 360-ton daily reduction of sulfur dioxide at the refineries. The amount of sulfur dioxide in the atmosphere has been reduced by 50 percent. Refineries have reduced losses of gasoline vapor, recently identified as a pollutant, by 100 tons a day.

Control equipment on metallurgical plants, in rock-crushing, asphalt paving and grinding processes, and in the food, paint, roofing, fertilizer, and soap industries is daily collecting 70 tons of dust, fumes, and other aerosols.

The efforts of the Air Pollution Control District of the County of Los Angeles to improve combustion, especially in industrial and com-

mercial incinerators, and to eliminate smoke at burning dumps have accounted for the removal of 60 tons of smoke, 50 tons of organic acids, and 10 tons of aldehydes from the air. The dieselization program of railroads has further reduced contamination from smoke.

As a result, the number of days of intense smog has decreased; the average visibility has increased; and the concentration of many pollutants has decreased. However, the level of atmospheric pollution is still too high. No end is in sight to the rapid increase in population and the expansion of the industrial community. Estimates indicate a growth to 16,000 industrial plants and 6,000,000 persons in Los Angeles County by 1960.

New Frontiers for Study

Certain phases of the Los Angeles smog problem must still remain in the hands of the scientists and development engineers. Useful information for air pollution zoning programs is very much needed. In Los Angeles, the expansion of the community, and the critical weather conditions which prevail for 270 days each year, make it necessary to minimize the effects of the contaminants which remain after engineering controls have done the best possible job.

In order to ascertain the average wind currents, the Air Pollution Control District's meteorology department now collects wind data from over 30 stations. This study, requiring at least 3 years to complete, will be used in conjunction with the comprehensive data already obtained from air sampling and source analyses programs.

Over 6,000 tons of waste material must be disposed of daily in Los Angeles by industry, commerce, and private residents. Although improved equipment and techniques have materially reduced smoke emissions from the first two sources, domestic rubbish contributes an ever-increasing amount of atmospheric pollution. Research should be directed to the field of combustion and to the means of conserving valuable materials in rubbish. Composting certain wastes for use as fertilizer or recovery of the heat value should be aggressively explored. New ways for using and disposing of rubbish

would be a boon to every metropolitan area and a great step forward in reducing air pollution from millions of incinerators.

The physiological effects of air pollution is a virtually untouched field. Many living in industrial areas believe their health is being impaired. Controlled experiments are extremely difficult because of the relatively low concentrations of most contaminants. Where submicron dusts or fumes are involved, fundamental research has progressed to a point where some experiments can be undertaken, but years of research will be required for even preliminary answers.

The control of gasoline vapor is another major problem. Despite the amount now kept out of the air in Los Angeles, about 500 to 700 tons a day are still escaping from the processing and distribution of gasoline. Methods to correct losses should be pressed forward. Refinery processes, evaporation losses, and transfers of gasoline from tank to tank are the main control points.

The release of hydrocarbons from automobiles requires detailed study. While some preliminary research has been started in Los An-

geles, much remains to be done. Evidence indicates that the exhaust from vehicles may be an item for control measures. Before any action can be taken, the contribution to general air pollution of a community, or to the street-level nuisance effect, must be clearly demonstrated.

Other projects such as the reduction of sulfur dioxide from coal- and oil-burning equipment, improved fly ash collectors and basic studies on filter media, analytical methods, and instrumentation are being undertaken by many research organizations. It is recognized that these studies will assist the control efforts of industry and government, but it is short-sighted to ignore problems which appear on the horizons of our growing communities.

Increased populations, technologic changes in industry, and the use of new products generate new community problems before the old ones are solved. A striking example in the field of air pollution control lies in the fact that techniques are not available for full protection to a community against potential radiation hazards, which could develop from the wide use of radioactive materials in industrial processes.

Public Health Service Staff Announcements

Dr. H. Van Zile Hyde, chief of the Division of International Health, Public Health Service, has been appointed by the President to serve as United States representative on the Executive Board of the World Health Organization. His appointment was confirmed by the Senate on July 20, 1953. Dr. Hyde previously held the position of United States representative from May 1948 to May 1952, which encompassed the first two terms of the United States' membership on the Board. In May 1953, the United States was elected by the Sixth World Health Assembly to its third term.

Dr. Hyde, for several years active in international health affairs, most recently as director of the health and sanitation staff, Technical Cooperation Administration, has been chief of the Division of International Health since March 1, 1953. This division, transferred from the Office of the Surgeon General to the Bureau of State Services on April 1, 1953, is also responsible for recruitment of personnel for the public health missions of foreign assistance programs, technical supervision of their work, and placement of foreign personnel for professional training.

Dr. Frederick J. Brady, international health representative in the Division of International Health, has been appointed by the President to serve as alternate representative on the WHO Executive Board.

Dr. John R. McGibony, chief of the Division of Medical and Hospital Resources of the Public Health Service since 1949, has been appointed professor of medical and hospital administration and director of the course in hospital administration in the Graduate School of Public Health of the University of Pittsburgh. A commissioned officer of the Public Health Service since 1936, Dr. McGibony contributed to the planning and development of the Hospital Survey and Construction Program. In 1946 he became assistant chief of the Division of Hospital Facilities. Prior to this appointment, he served first as hospital administrator and then as director of health for the Bureau of Indian Affairs, Department of the Interior. In recent years, Dr. McGibony was also hospital consultant to the National Security Resources Board and the Federal Civil Defense Administration.

The Teaching-Learning Situation

By GORDON W. ALLPORT, Ph.D.

Principles derived from the psychology of learning and of human relations can be applied to medical teaching. A widely known Harvard psychologist tells coordinators of cancer teaching about the need for teacher enthusiasm for the subject being taught . . . the classroom lecture and its participants . . . the student's growing-edge and his ego-involvement . . . and possible methods for imparting the skills needed to reduce patient anxiety.

IN GENERAL, the rules for effective teaching and retentive learning that I offer here somewhat dogmatically are as valid in the field of medical education as in the field of liberal arts. For whether as teachers our aim is to communicate the principles of cancer, of psychology, or of English composition, the basic rules are essentially identical.

The first requirement for successful teaching is too obvious to require explanation: The teacher must himself possess expert and up-to-date knowledge of his field. The only comment on rule number 1 is that while it is a necessary principle of good teaching, it is by no means a sufficient principle. Plenty of men with expert knowledge are failures as teachers.

The second requirement reaches into the domain of temperament. A good teacher needs to have a contagious enthusiasm for his subject, by which I mean he should be intellectually noisy. Not that he must be loud in voice or garrulous. His manner may be soft or bold,

his voice quiet or loud, his bearing assertive or genteel. But there must be a tonicity of interest and a pressure to communicate that convince the student that something of vital importance is gripping the teacher's mind.

For teachers who feel timid and unsure in meeting a class, there is a reassuring principle. Be yourself. If you know your subject and are reasonably prepared, then forget all about your appearance, even your tics, your stammer, your mannerisms, and your neurosis. Teaching is not acting; it is not oratory; it is not salesmanship. Unlike these vocations it does not depend on superficial address. It is a deeper process of communication. It can proceed successfully, no matter how unfavored the teacher is by nature, provided he wants to convey his more adequate information about a subject to a student who wishes to learn.

The Student's Growing-Edge

So much for the teacher's own equipment and personality. Look now at the interaction process itself, at the devices the teacher may use to enhance the success of his efforts.

I emphasize the need for any teacher to know where the student stands now in his knowledge. The target should always be the growing-edge of the student. It is true that at a given time

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no two students have precisely the same growing-edge. One has more knowledge than another; one has read the assigned textbook, another has not. The identical point made by a teacher may strike fire in one student and leave another cold. Even so, a medical teacher—any teacher—can acquaint himself with the previous average preparation of the students, assuming neither too much nor too little knowledge on their part. If in doubt, the instructor can always inquire of the group what the stage of their training may be. Three minutes taken at the beginning of the hour for this purpose are well invested. Unless I am mistaken this principle needs to be observed especially in medical education where specialist teachers are likely to be unacquainted with the background in fundamentals that the student brings.

The principle just mentioned does not, of course, preclude the need for review. To spend the next 5 minutes of the hour in reviewing the fundamentals of the subject is like laying fresh cement to hold the new bricks in place.

Talking reaches only the ear. The blackboard reaches both eye and ear. Why not give the student two chances for his money rather than one? For the comprehension of more difficult material investigations have shown that visual reception is superior to auditory. While not all audio-visual aids are effective, the teacher's duty is to keep abreast with audio-visual and demonstrational aids so they may be used if in his judgment they promise to be effective.

Return, for a moment, to the student's growing-edge. Those who are just entering into the study of a special topic sometimes complain of the tendency of some instructors to nourish their own edge rather than the student's. They cite the habit of some teachers who devote the instructional hour to some current article in a technical medical journal dealing with a small point of interest to the teacher but far too specialized for the student's current need. Even when the citation is accompanied by wholesome enthusiasm and excitement on the part of the teacher, it is basically a self-centered and not a student-centered device, unless, as occasionally happens, the journal article falls at the student's growing-edge. On the whole, the device seems

more suitable for the instruction of interns and staff than for younger medical students. The principle, being stressed here, says: Let the elementary student's present need, not the instructor's current enthusiasms, channel the instruction.

A synapse, we are told, may stop conducting if overcrowded by nerve impulses. So too may a student's mind. A common type of overcrowding is the recital by the instructor of endless statistics. They cannot be understood, certainly not retained. Round figures, in most cases, will fix the point in mind with sufficient accuracy. Learning will be aided if the amount of material to be assimilated within the hour is kept to manageable proportions, and the unessentials are trimmed out.

Invariably students praise instructors who know how to organize the material well. It is safest for most of us deliberately to follow a prepared outline. A medical student told me that he thought the subject of cancer had a natural, intrinsic, organization of its own. Whether he was right, or was unconsciously reflecting superior teaching, you can judge better than I.

Recent research has—broadly speaking—put the lecture on the defensive as a pedagogical method. Its potential virtues, however, are considerable. It can give perspective, inspire enthusiasm, and summarize much material from varied sources. But it can only do so if it is orderly in arrangement and distinguishes the highlights of a subject from lowlights.

There is no single method of employing a textbook to best advantage. Some effective teaching follows the text closely, never of course with monotone repetition, but with the purpose of underscoring important points, and made vivid through added example and personal experience. It seems a safe rule that the instructor should never disregard completely the assigned reading. The student is expected to integrate reading with oral teaching; it is only fair for the teacher to give what aid he can. Such integration is especially important for the beginning student.

Student Participation

Some of the principles may seem little more than pedagogical routine. Yet they have a

bearing on the most important of all factors in the teaching-learning situation—the motivation of the student to learn. Granted that a medical student is thoroughly committed to his chosen profession and suitably goaded by poverty, by zeal, or by spouse to pass the endless array of requirements, there is still the fact that one medical subject may seem to him dull and lifeless, and another may inspire him to put forth maximum learning effort. What principle is the teacher of the first subject failing to observe? Why is his subject as he presents it dull and dead?

In all probability he is failing to maximize the student's opportunity for participation. A student learns more by doing than by listening. The educational philosophy of John Dewey is certainly correct in stressing this generalization. So too is the Chinese adage:

When I hear it I forget it
When I see it I remember it
When I do it I know it

The Role of Lectures

Lectures have their place. They can properly supplement participation, or, to a greater extent than most lecturers realize, they can evoke it. When the student asks a question, he is participating. When he is asked to look up the answer and report back to the class at the next hour, he is participating still more. He is less likely to forget the information than if the instructor, like an oracle, pronounces the answer. Such participation can be woven into a lecture, though available time limits its use. When a diagnosis is called for, let the student try his hand at it before the instructor makes his pronouncement. And—very important—give the student plenty of time to reach his decision, so that he may know that his best effort at the task has succeeded or failed. I wish that all teachers of all subjects would obey the rule to give the student time. It is a common failing, especially on the part of the insecure teacher, to choke off a student wrestling with a problem, and himself to supply the answer before the gains of participation have been achieved.

Participation is a large subject. It covers student questions, recitations, prepared papers, practice diagnoses, laboratory work, case pres-

entation, and much else besides. A particularly effective method for participant study is the assignment of questions in advance for a coming examination or for the next day's class work. In the latter event it is well for the student to correct his own paper, spotting his own errors and thus cultivating his own growing-edge.

The law of participation has, of course, a mundane practical side. The possibility of participation is normally in inverse ratio to the size of the group being taught. Medical schools surely know this fact; else it would be difficult to explain and justify the severe restrictions on the size of entering classes. In teaching the radiological aspects of cancer, for example, one can do with a cluster of five or six students what one cannot do with thirty. But we should not take refuge in this easy alibi. Even in a large lecture class alert teachers can often discover small ways to elicit participation. Instead of droning on for an hour without interruption the teacher can have his listeners in their seats perform small experiments or write down what they think are the right answers to certain questions which later will be answered by the lecturer. There are more devices to elicit participation than we teachers realize.

Ego-Involvement

But participation has deeper psychological significance. Who participates? It is surely not the hands and voice of the student. It is, if I may introduce the term, his ego. In recent years psychologists have had much to say concerning ego-involvement. In one sense ego-involvement is basic to all learning; in another limited sense, it impedes it. In the broad sense, favorable to learning, we may say ego-involvement is more or less identical with interest. By a principle of subsidiation a student will learn to absorb and organize material that is consonant with his own interest system. The instructor will elicit this form of ego-involvement if he is successfully aiming at the present growing-edge of the student, and if by his own example he conveys enthusiasm for the subject.

In a more restricted sense, ego-involvement means self-esteem. Even a medical student—

burdened and misshapen as he is by poverty and prescriptions—is strictly normal in respect to his human sensibilities. For him, as for all learners, praise is a great incentive. If he does a good job he wants to know it. Next time he will deliver an even better performance.

But if praise is favorable to the effective acquisition of knowledge and skill, ridicule and embarrassment are not. Here we come to a curiously sadistic teaching-learning situation that has nothing to be said for it. Why some teachers like to pounce on a given student without warning, and with fierce aggression demand that he produce the precise point that the teacher has in mind at the penalty of being ridiculed, is a question in the psychopathology of teachers that we shall not explore. The principle in question can be summarized by saying that to raise the student's self-esteem is a mark of good teaching; to lower it is (with very rare exceptions) a mark of bad teaching.

Reducing Patient Anxiety

There is one important special skill that every medical student—especially those dealing with cancer patients—must acquire. How to learn this skill poses a major problem for the teaching-learning situation. The alleviation of the patient's anxiety is one ability that certainly cannot be taught by lectures. How then may a student learn it? Unless I am badly mistaken, medical education in general and cancer education in particular pay too little attention to this difficult pedagogical problem.

Recently I reviewed data collected in connection with a project in cancer research. The problem concerned reasons why women with breast lesions had delayed in seeking treatment even after they suspected the nature of their difficulty. I am not prepared to offer a statistical report of this research, but the large number of cases where the physicians themselves seemed at fault was disturbing to me. They aroused so much anxiety that the patient repressed the matter, disbelieved the doctor, or took refuge in some other form of psychological defense. Disturbing too were the cases where patients reported callous acts on the part of doctors. In one case, following an examination, three physicians held their consul-

tation in the corner of the woman's hospital room; then left the building without speaking to her. For days she lay in agonized doubt, without knowledge of her condition and without the clearly indicated supportive psychotherapy.

Most experienced physicians, I know, behave very differently. Many make it their first duty to allay anxiety to the best of their ability. I am not here presuming to raise the disputed question as to how much a patient should be told about his condition. My point is merely that however much is told it can be told so as to relieve anxiety to the maximum degree possible.

How is the reassuring manner to be learned? What approaches may be used in breaking bad news? For that matter, how can any physician in any kind of case help lift the patient over his psychological hurdles? A young medical student—especially one not temperamentally gifted in this regard—has much to learn. While I am not wise enough to solve this difficult problem, I can offer two teaching devices that have been successful in modern attempts to give instruction in the field of human relations. Possibly you may see merit in one or both of them for the teaching of doctor-patient relations.

Apprenticeship

The first device is an extension of the ancient method of apprenticeship, aided by modern technology. Perhaps as an understudy to a skillful doctor, both in his technical work and in his human relationships, a student would be given a model from which to pattern his own efforts. But there are limitations to apprenticeship. Can a medical student accompany a physician who is about to tell a patient that he will die of carcinoma of the liver? Modern technical developments include the possibility of hidden recordings, also of using one-way screens made of molecular chromium glass. Granted that these devices are not adapted to home calls, is there the possibility that they can be employed effectively in hospitals for the teaching of doctor-patient relations, not only when matters of life and death are involved but in other situations calling for skilled efforts at anxiety-reduction?

I realize that this suggestion, made most tentatively, raises problems of medical ethics. Does it differ significantly from ward rounds, attendance at operations, or other occasions where medical students are introduced to intimate personal relationships? In certain psychological laboratories the ethical problem of using hidden recordings has been met in the following way. The subject (patient) is later told that a recording was made for teaching purposes. If he will permit it to be so used the investigator will be grateful; but if he prefers that it not be so used the recording is straightway destroyed. The one-way screen does not, of course, permit this ethical safeguard. But it too may have its limited uses, for example, in cases where a patient gives advance consent.

Psychodrama

The second suggestion raises no problems of ethics. It concerns the possible employment of role-playing in cancer education. Let one young medic play the part of a patient who is to be told that he has an operable malignant growth. Let another play the role of his physician. The situation can be specified somewhat more fully. The patient, let us say, is 45 years old, father of a family, worried about expenses, as well as about the possible outcome. The physician in his own mind is not too certain that the outcome will be favorable but like all physicians he holds the optimistic bias. Innumerable situations of this sort can be invented to start off the psychodrama. When the play has run its course, there can be class discussion and criticism of the "physician's" behavior. The class instructor may have suggestions to make. The scene can be played again until it meets general approval. The

actors can, and should, reverse their roles. And every student in the class can, and should, have extended practice.

This method can helpfully expand and deepen the experience the student now gets through his attendance at clinics. Situations he has observed can be more fully explored through acting them out. Hypothetical situations that anticipate his own later responsibilities can be used. The process of role-playing, awkward as it is for the tyro, can in time confer upon him flexibility in manner and an invaluable understanding of the patient's point of view.

It is true that teachers who would employ this method themselves need training in its use. There are experts in psychodrama who would, if asked, turn their attention to the field of doctor-patient relations, and if it seems desirable, conduct a workshop in the technique for the benefit of interested medical teachers.

It does no good, I feel certain, to tell a medical student that he should allay anxiety, that he should be sincere, reassuring, quiet, calm, confident. He needs concrete example and he needs practice in human relations. I hope that in the future medical, especially cancer, education will develop methods to train in these skills, and thus rub off in advance some of the rough edges of young practitioners.

Apart from the problem of alleviating anxiety all of the features of the teaching-learning situation that I have mentioned are common pedagogical property. The principles I have stated with such brevity derive from the psychology of learning and from the psychology of human relations. Experience has found them to be sound guides to teaching. I hope that some of them may have suggestive value for you.



The Development and Evaluation Of Cancer Diagnostic Tests

By JOHN E. DUNN, Jr., M.D., and SAMUEL W. GREENHOUSE

ANY ATTEMPT to bring the majority of human cancer cases to clinical recognition in a curative stage, at least until new therapeutic methods are established, involves the ability to recognize the disease in an asymptomatic individual. Searching the general population for unsuspected cancer using clinical procedures has been explored through cancer detection centers, but has been found to be impractical because of the inadequate capacity of such facilities and the relatively high cost per examinee.

The need for a procedure to indicate the existence of unsuspected cancer has led to many attempts over the years to devise a laboratory procedure that would show whether or not an individual is harboring a cancer. These procedures have usually taken the form of chemical, biological, physical, or immunological measurements on readily available human materials such as blood, urine, and exudates, or of skin tests.

A priori it can be said that the possibility of developing such a diagnostic test for a disease is dependent on unique and specific substances produced by or as a result of the disease, which can be measured by laboratory procedures; or by quantitative changes in normal body con-

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Public Health

MONOGRAPH

No. 12

The accompanying article discusses the principal findings presented in Public Health Monograph No. 12, published concurrently with this issue of Public Health Reports. These papers, by authors from the Medical College of Alabama, Tufts College Medical School, the Schools of Medicine of the Universities of Washington, Tennessee, and Kansas, and the Research Laboratory of the Jewish Memorial Hospital, Roxbury, Mass., were assembled by the National Cancer Institute, National Institutes of Health, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Evaluation of cancer diagnostic tests. Public Health Monograph No. 12 (Public Health Service Publication No. 275). U. S. Government Printing Office, Washington, 1953. Price 30 cents.

stituents that are more or less uniquely associated with a specific disease. Various immunological tests for acute infectious diseases are classical examples of the former, and the glycosuria associated with diabetes mellitus, of the latter. Unfortunately, cancer research has not as yet demonstrated well-established qualitative changes, either in cancer tissue as such, or in the host organism supporting the cancerous growth. Quantitative changes are known to occur in cancer tissue as compared to the corresponding normal tissue. Also, there are quantitative changes in the host, but these changes are not uniquely associated with cancer. The question, then, becomes one of whether a proposed diagnostic procedure based on empirical observation is perhaps founded on a mechanism that is yet unknown or not fully elucidated in the mass of cancer research knowledge, or whether the known quantitative host changes, singly or in combination, might not serve as a means of distinguishing cancerous from normal individuals and from those with other diseases.

In general, attempts to find a diagnostic test for cancer have been met with an attitude of pessimism since the body of cancer research knowledge has apparently not yet established a firm basis for development of such a test. On the other hand, those faced with the urgent demand that something be accomplished now to reduce human cancer mortality are confronted with the necessity of taking calculated risks.

In 1948, several university groups indicated an interest in exploring proposed cancer diagnostic tests to determine their usefulness by requesting grant funds from the National Cancer Institute. These projects were approved by the National Advisory Cancer Council and a loosely coordinated program was developed in which the five university groups looked to the cancer control branch of the National Cancer Institute for liaison and technical assistance in the analysis of data. The five groups carrying on this work are under the direction of:

Dr. Stuart W. Lippincott, professor of pathology, University of Washington Medical School, Seattle, Wash.

Dr. F. Homburger, director, cancer research and cancer control units, department of surgery, Tufts College Medical School, Boston, Mass.

Dr. J. K. Cline, chief, cancer research department,

Medical College of Alabama, University of Alabama, Birmingham, Ala.

Dr. Douglas H. Sprunt, director, Institute of Pathology, University of Tennessee Medical School, Memphis, Tenn.

Dr. Robert E. Stowell, professor of pathology and oncology, University of Kansas Medical Center, School of Medicine, Kansas City, Kans.

The principal aims of this program were:

1. To determine whether any of the many diagnostic tests for cancer proposed in the past meet the original claims made for them by their developers when carefully evaluated by another laboratory.

2. To follow up any leads in basic biological, chemical, or biochemical research bearing on the diagnostic problem and possibly leading to the development of a test.

Additional purposes served by this program, purposes that were made apparent only after the program had been under way, were:

1. To provide a much needed statistical methodology in order to unify and make comparable different evaluations of the same test and also evaluations of different tests.

2. To utilize the experience and facilities of the participating groups to evaluate tests developed currently.

3. To obtain leads meriting further investigation resulting from the analysis of data collected by the various groups.

The purpose of this paper is to describe briefly the accomplishments of this program in fulfilling these aims. Much of what follows has already been said or reported elsewhere; the remainder is new.

Methodology

In order to evaluate the practical usefulness of cancer diagnostic tests, the performance requirements for a useful test must first be decided upon. Since the primary objective was a test that would indicate the probability of unsuspected cancer, the requirements of a case-finding or general population screening test were given primary consideration. Criteria were proposed and a statistical method for analyzing data on the basis of these criteria was developed (1). It was realized that a test would have other uses as well, such as for differential diagnosis in a diseased individual. Evaluation studies, therefore, included patients with

diseases other than cancer. However, it appeared reasonable that a test that would not distinguish satisfactorily between individuals apparently free of disease and those with cancer could not distinguish the latter from other diseased individuals.

Most of the general tests proposed to detect the presence of cancer are blood tests, based on the principle that some factor, for example, the blood proteins, enzymes, or an immunological agent capable of reacting with an antigen, appear in the blood serums of cancerous individuals and either are lacking or are quantitatively different from that in the blood serums of normal individuals. Measurement of this factor in a group of normal individuals and in a group of individuals with known cancer, in most cases, gives rise to a continuous variable more or less symmetrically distributed about a modal value which differs in the two groups. To make this process a diagnostic procedure it is necessary to select one value of the variable, the so-called critical value, to serve as the dividing point for future tests. If a person's measurement, say, exceeds the critical point, he would be classified as positive; if it falls below, he would be called negative. (In the past we have stressed the fact that no single test can do more than result in these designations and only provides evidence that a person called positive has some probability of having the disease. It is only after a person so classified has undergone clinical study that cancer can be diagnosed.) Once the critical point has been selected for any set of data, it becomes possible to refer to two measures inherent in the test, namely, the proportion of false negatives (sensitivity) and the proportion of false positives (specificity). These measures are completely dependent upon the choice of critical value and, in fact, vary as the critical point varies. We illustrate this in the following tabulation, based on an evaluation of the Huggins iodoacetate index by Homburger and associates (2).

Critical value:	Percent false positives	Percent false negatives
5.3-----	5	55
5.9-----	10	43
6.8-----	20	24
7.8-----	40	17
8.6-----	60	9

The implications in analyzing evaluations of diagnostic tests are clear. Contrary to past experience, an evaluation must not adhere blindly to the same critical value reported by the originator. The investigator must find the critical value that will give either the same specificity or sensitivity as that obtained by the originator and then compare the remaining measure. For example, if, from the previous table, one were to advocate the Huggins iodoacetate index because it gave 24 percent false negatives for 20 percent false positives, then the purpose of an evaluation is to confirm that this procedure gets 24 percent false negatives for 20 percent false positives. The investigator evaluating the test collects his own data and attempts to reproduce the biological and chemical aspects of the procedure as carefully as he can. Often biases exist but, even if they did not, characteristics of the distribution, such as the critical point giving 20 percent false positives, are subject to sampling variation. (Our experience has been that consciously or unconsciously the investigator makes some modification in techniques and that sampling variation is small compared to these biases.) Thus, if the investigator were to seek out the value 6.8 as his critical point because the originator used this value, he might find 35 percent false negatives and 15 percent false positives or any other proportions. On this basis he would conclude the original report has not been verified. What, in fact, he should do is find the critical value giving him, say, 20 percent false positives and then determine the percent of false negatives for this critical point. If this turns out close to 24 percent or less, the evaluation confirms the original report; if it is considerably higher, then the investigator rejects this test based on the way he performed it.

The two essential points in an evaluation program are, therefore:

1. Two sensitivity measures must be compared where each is obtained for a fixed specificity (or the converse).

2. The critical value to be found in determining the sensitivity is itself determined by the given specificity.

Costs of examination and incidence of cancer are such that it was reasoned no screening program for cancer could tolerate more than 10

percent false negatives for at most 5 percent false positives. These criteria need not be followed if one searches for a diagnostic test to be used for other purposes, such as differential diagnosis.

Evaluation of Tests

A considerable number of reports have thus far been published as a result of the cancer diagnostic test evaluation program. A list of these reports, classified according to type of substance being measured, appears as an appendix to the most recent publication, a monographic collection appearing as *Evaluation of Cancer Diagnostic Tests*, Public Health Monograph No. 12. In addition to tests on which reports have been published, several tests were evaluated by the various groups at the request of the National Cancer Institute and other institutions. These represented tests being developed currently and for which no large-scale evaluation was necessary in order to reject them. On the other hand, several tests announced in the last 5 years were evaluated fully and reports were published.

Unfortunately, as reference to these publications will show, none of the procedures evaluated has been judged capable of discriminating between individuals with cancer and those without cancer to any reasonably high degree. For a cost of 5 percent false positives among presumably normal, healthy individuals, these tests, as evaluated, detected as positive from 10 percent to about 75 percent of known cancer patients, with the majority ranging from 40 percent to 60 percent. For the most part, these tests also found as positive from 25 percent to 50 percent of patients with diseases other than cancer. But more serious from the point of view of screening is the fact that these tests gave rather poor results among known cancer patients with well-established disease. Presumably, if groups of individuals with very early cancer were available, these tests would detect as positive still smaller proportions.

Evaluation and Developmental Findings

Although results have been negative in the search for a general test for cancer, all of the

participating groups are continuing in some developmental field of their own. In some cases, investigation is being made into the diagnosis of cancers of specific sites; in others, work is being continued on those general tests which a group thought promising. Every group is doing research into the development of its own procedure, both on the laboratory and clinical level.

All participants have concluded from their evaluations thus far that much has yet to be learned about the relationships to the cancer process of those factors which these tests purport to measure. The awareness and the need of a greater understanding of the effects of this process on the biochemistry of the individual are evident in the report on the Proceedings of the First Conference on Cancer Diagnostic Tests (3). The very purpose of this conference, sponsored by the National Cancer Institute, was that "... further developmental research in the cancer diagnostic test field should be stimulated."

It would appear that one reason these tests have failed is the lack of specificity in the factors assumed to be changed by cancer. Generally, these factors seem to be affected by many disease processes. In fact, they are found to vary among normal individuals. This raises some interesting questions concerning the concept of a diagnostic test (see paper by Toenies in reference 3). Given that normal individuals really differ with respect to a given factor, does the single individual's test value vary with respect to time or does it remain relatively stable? If it does change with time is this variation random around some true value and, if so, how does it compare with the variation among individuals? If it is relatively small then obviously if an individual's test value begins to increase progressively over time, he should be suspect even if his test values are not above the critical point (assuming cancer values are on the average larger than normal values). However, before such serial testing on an individual basis can be of use, much data must be gathered to answer the above questions on variation.

A start in this direction was made by one laboratory, which was able to obtain more than one blood specimen on normal persons over a

period of a year. We illustrate some of these ideas referring to the evaluation, by this laboratory, of the least coagulable protein test proposed by Huggins (4). With respect to this test, the values of 137 normal individuals ranged from 1.10 to 1.91 with a variance, $\sigma^2=0.0139$. The variation among individuals, measured by the variance, can be considered to be made up of three components: variation among true individual values, σ_{Ind}^2 , variation between specimens from the same individual when specimens are taken over a period of time, σ_{sp}^2 , and variation due to the reproducibility, or measurement error, of the technique, σ_m^2 . Estimates of these components were as follows: $\sigma_{Ind}^2=0.0075$, $\sigma_{sp}^2=0.0022$, $\sigma_m^2=0.0035$. Variation due to specimens, σ_{sp}^2 , represents about 16 percent of the observed variation among individuals and about 30 percent of the estimated variation of true individual test values. Consider an individual with a true value of 1.3. Assuming no improvement in technique can be accomplished to reduce measurement error, 95 percent of specimens from this person should result in values ranging from

$1.3-2\sqrt{\sigma_{sp}^2+\sigma_m^2}$ to $1.3+2\sqrt{\sigma_{sp}^2+\sigma_m^2}$ or 1.15 to 1.45. Now, if this person gets cancer, his true value should begin to increase and hence his test values should eventually fall outside his normal range. When this occurs, his test should be considered positive even though no value is greater than the critical point (in this case, 1.63).

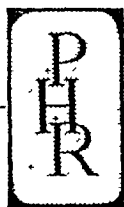
Considerations of this sort have come out of the analysis of the data gathered in the evaluation program. For two other tests, σ_{sp}^2 represented a much greater proportion of the total variation. In fact, for one test it was almost 50 percent of the total variation and exactly equal to the estimated variation of true test values. In these instances, no serial testing on an individual basis would be meaningful.

Present and Future Developments

As indicated earlier, the various laboratories that have been engaged in diagnostic test evaluation have continued investigating certain procedures that still appear to hold some promise, and are exploring developmental possibilities that have attracted their interest. The former includes further work with a serum flocculation reaction that has undergone additional development since originally reported; exploration of fluorescence phenomena observed in the blood from cancer patients; polysaccharides of serum that are augmented in cancer patients; and use of several serum protein determinations in combination. Developmental investigations by these groups include investigations into a sensitive means of detecting abnormal steroid in the blood or urine; a complement fixation test; a study of the factor responsible for liver catalase reduction in cancer; and a specific measurement of prostatic acid phosphatase. This last has been developed to the point where several laboratories are evaluating it as a means of diagnosing premetastatic prostatic cancer.

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A Review of Pollenosis And the Role of Weeds

By W. C. SPAIN, M.D.

THE TERM "WEED" and the term "allergy" not only are difficult to define but are vague, indefinite, elastic, and subject to wide variations in interpretation. An agreement upon the concept of these two expressions is essential to any remarks that may be made upon them.

When does a plant become a weed? What is a weed? One's point of view would have something to do with reaching a decision. The overgrown vegetations of the tropics, rank and commonplace, become rare and pleasing exotic plants elsewhere; the goldenrod, an annoyance to the farmer, may appear as a colorful attractive flower to the urban dweller. It would seem that a plant becomes a weed when its nuisance value outweighs its esthetic or economic worth to man; when its lustiness and vigor, despite its beauty of form or flower, permit it to crowd out more delicate and more desirable plants; or when its noxious qualities make it a threat to the well-being of man and animal. On the basis of their being specific hazards to his own health, the allergic individual is inclined to group as weeds many additional plants which actually are of value in the general economy and are attractive and harmless to the majority of the population, but to him are decidedly disturbing.

The person suffering from an allergic malady is a peculiar individual, due largely to the fact

that his symptoms are caused usually by a maladjustment to his physical environment rather than by any bacterial invasion of his body by infection. His ailments result from exposure to commonplace substances with which all persons are equally in contact. Although exposed to these substances to a degree no greater than are other members of the general population, his symptoms are prompt, severe, incapacitating, and place in the role of a major offender with great etiologic importance such an ordinary and usually harmless agent as the ever-present weed.

Heredity a Factor

This tendency to react with marked discomfort to his surroundings is hereditary. It is a family trait transmissible from a member of one generation to that of another, apparently governed according to the laws of dominance that Gregor Mendel found operative in his study of the transmission of traits of the sweet pea. It is important to remember that the feature which is inherited is the capacity of the allergic individual's tissue cells to become extremely irritated or sensitized in a specific manner. The well-developed clinical allergic complaint itself is not inherited, its form being influenced greatly by the exposures and contacts in the individual's environment. Hay fever, rhinitis, bronchial asthma, bronchitis, and dermatitis (urticaria and eczema) are examples of allergic maladies caused by this cell sensitization. The tendency to an allergic condition may be manifested in a parent as hay fever, in the child as an entirely different ailment such as bronchial asthma.

The Role of Phagocytosis

Nature has provided a clearing mechanism for protecting man from the irritation of foreign substances passing into his system by absorption through the respiratory and gastrointestinal tracts and the skin. These foreign substances, naturally and normally present, are in the air we breathe as are pollens, dusts, animal danders; in the food we eat; in plant resins with which the intact skin comes into contact. Upon being absorbed into the body, such sub-

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stances are attacked by tissue cells especially equipped for the purpose of neutralizing and disposing of any invading foreign material.

This process is completed without harm to the normal individual or his tissue cells, and without apparent detrimental after-effects such as the development of allergic symptoms. In 10 percent of the population, however, this special protective mechanism or phagocytosis does not end with this normal activity of disposing of foreign matter. The mechanism, often through hereditary influences, extends beyond this, becoming exaggerated and overcompensating. Enormous increases in the number of the defensive tissue cells or a great enhancement of their protective activities, or both, are stimulated by their contacts with the foreign substances. Such cells are equipped to produce a prompt and vigorous attack upon the reinvading foreign substance. This activity is responsible for the release of toxic materials which cause the severe, often incapacitating allergic symptoms.

Individuals whose tissue cells are thus sensitized to intense activity upon exposure and re-exposure to foreign substances are termed allergic, and their symptoms may assume a variety of forms such as those of hay fever, bronchial asthma, or of allergy of the gastrointestinal tract or skin, depending upon the body area in which occurs the greatest degree of sensitized cell activity. Urban dwellers and rural workers, child and adult of all races are affected. The foreign materials, the causative agents, are many and varied, but are usually airborne as pollens, dusts, or ingestible substances such as foods and drugs.

Airborne Pollen

Of major importance are airborne plant pollens drawn into the respiratory tract in the inhaled air. The heavy, sticky type of pollen which tends to be immobile unless transported by the bodies and wings of visiting insects and bees is rarely the cause of hay fever. The colorful, attractive, often scented blossoms such as of the rose, the daisy, or goldenrod, designed to lure these carrying agents, are harmless unless cut and brought indoors where they dry, allowing their pollens to permeate the closely con-

fined atmosphere of the house. The airborne pollens of the plants with inconspicuous, less noticeable blossoms are the usual cause of hay fever. Produced in tremendous excess, buoyant and widespread, these pollens are responsible for the distress of thousands of persons with hay fever and with bronchial asthma.

Not all types of airborne pollen are hay fever and asthma producers. Over the past four decades it has been the goal, seemingly impossible, of allergist and of botanist to discover in all the wealth of vegetation the particular offenders, and to identify the plants whose pollens produce allergic symptoms. In this the investigators were aided by two tremendously important facts; the first, that the skin cells of the allergic patient share the sensitization found in other types of tissue cells; and the second, well known to you, that there has been established by nature a reliable, dependable schedule of pollination characteristic of each plant, a schedule influenced but slightly by climatic or weather variations.

The Skin Test and Pollen Count

The skin test is the great diagnostic aid which enables identification of the patient with hay fever and also determines the specific, exact pollen causes important in his case. Upon exposing the cells of the skin by puncture or scarification procedures to minute carefully estimated amounts of extracts of the various suspected pollens, characteristic changes will occur, but only at those sites tested with the pollens to which the patient's cells are sensitive. Within a few minutes itching, flushing, and swelling of the skin will occur, with the development at the test site of a wheal or small hive, which persists for 15 to 20 minutes, then disappears. This test is very specific and delicate. It enables the investigator not only to identify the particular offending pollens, but also to determine the degree of sensitiveness present in the individual to each specifically offending pollen, a matter of great variability from patient to patient, and from pollen to pollen.

Well known to the patient suffering from a pollen allergy is the period within which his symptoms occur. The seasonal limits of onset

and offset of his discomforts are relatively constant from year to year, provided he continues to be in the same environment. By comparing the period of suffering with the pollination period of various plants producing airborne pollen, the investigator is enabled to narrow the list of possible causes in each patient's problem. The individual with hay fever occurring from mid-August to October is immediately suspected of being a victim of ragweed pollen, since its pollination period coincides with the patient's time of discomfort.

Additional useful information regarding pollen allergy may be obtained by comparing the patient's daily fluctuations in the degree of severity of his symptoms with the daily census of his specifically disturbing pollen as influenced by variations in weather conditions. A daily count of the pollen trapped upon an adhesive coated slide, exposed for constant periods, will provide the information upon the rate of pollen production. Thanks to their characteristic appearance microscopically, a classification can be made of those pollens most prevalent. Ragweed pollen has been made the object of special study. The New York State Department of Health has thus been able to determine areas in the Adirondack Mountains relatively free of this weed, and has prepared a valuable list of these for ragweed sufferers (1). New Jersey (2) and the city of Detroit (3) sponsor active pollen surveys, and according to information supplied by the division of laboratories and research, New York State Department of Health, New Hampshire and Maine also conduct these surveys.

The lists of weeds and plants which cause hay fever are known through the highly successful efforts and zealous cooperation of the botanist. Field studies and pollen surveys, the collection of pollen from suspected plants, and its subsequent testing by the allergist upon pollen victims has yielded an evergrowing mass of information. Throughout the years important data has been collected in all areas of the United States, the Central and South American Republics, England, and other European countries. Two of the most valuable reference volumes upon the hay fever producing plants of the United States are that of Wodehouse (4), and Durham (5).

Three Seasonal Groups

In the Northeastern area of the United States the dates of pollination of the important hay fever and asthma producing plants permit a sharp division of the pollen victims into three groups. In the first are those whose symptoms occur between mid-March and June first. No weed is a culprit although many tree pollen victims in this group are ready to stigmatize as weeds the real sources of their discomfort, which are the ash, beech, birch, elm, oak, hickory, paper mulberry, and poplar. The pollen of the alder and of the swamp sedges occasionally produces symptoms.

In the second group, the symptoms persist from mid-May to mid-July. English plantain (*Plantago lanceolata*) is a weed of much importance here, with sorrel (*Rumex acetosella*) of lesser importance. Of greater moment than these weeds, however, is the family of grasses—timothy, orchard, oat, rye, redtop, June, bermuda, sweet vernal, velvet. Roses, since insect pollinated, are innocuous unless cut and kept indoors. The term "rose cold" is, therefore, an incorrect designation for the summer type of hay fever.

In the third group of patients the symptoms occur from mid-August to frost, and it is here that the weed asserts its importance. The ragweeds, giant and dwarf (*Ambrosia trifida* and *elatior*), are the chiefs of them all, having the dubious reputation of being the cause of more suffering than all other pollens combined. Not only does the discomfort they produce involve a greater number of victims, but the suffering is more intense in degree and occurs at a time of the year, at the threshold of autumn, when secondary, complicating bronchial and sinus diseases are encouraged to appear. It has been estimated that one-third of all untreated ragweed hay fever sufferers eventually develop bronchial asthma, a much more serious and disabling disease. Of lesser importance than ragweed are cocklebur (*Xanthium*); lambsquarters (*Chenopodium*); pigweed (*Amaranthus*); mugwort (*Artemisia*); American hemp; wild rice (*Zizania*); great reed (*Phragmites*); marsh-elder (*Iva*). Usually goldenrod has on it some adherent ragweed pollen, deposited by wind from adjacent ragweed but, as stated,

goldenrod does not deserve the evil reputation it has. Its pollen, since insect borne, will cause no symptoms unless the blossoms are brought indoors.

The list of weeds which produce allergic discomfort is even greater in other areas of the United States. In the plains States, southwestern States, and the Pacific States, the most troublesome are the chenopods, thistle (*Sal-sola*), and burning bush (*Kochia*), wormwood and sagebrush (*Artemisia*).

Areas Free of Pollen

Since the distressing allergic symptoms result from actual physical contact of pollen and patient, the surest way for the patient to obtain relief is to escape to an area where the pollen producing plants particularly disturbing to him do not grow. Bermuda, Nova Scotia, the tropics, our own southwest and areas in the Rocky Mountains offer to ragweed sufferers complete freedom from hay fever. Less completely free localities are the southern tip of Florida, California, areas in the heavily wooded sections of the upper Michigan peninsula, of Maine, and of Canada and some parts of the White and of the Adirondack Mountains. The pollen surveys of the New York State Department of Health have established the relative freedom from pollen of numerous Adirondack localities (1).

Methods of Destroying the Weeds

Such escapes from pollen, however, are impractical or impossible for the majority of sufferers, who cannot be absent from their work or their families for the long intervals required. For them relief can be expected by attacking the hay fever producing weeds themselves by eradication, a slow, painful, and not very successful process, by manual removal or by cutting at the strategic moment when pollination is imminent.

Far superior are the chemical methods. New York City, according to information from its department of health, and several New Jersey communities conducted in 1946 (2) the first centrally directed ragweed control spraying program. By employing a spray of the hormone 2, 4-D, dichlorophenoxyacetic acid, it

has been possible greatly to reduce the growth of ragweed within the city limits. In proper dilutions it is reported to be selective in action in that it does not kill desirable grasses, but it is known, of course, to be lethal for vegetables and flowers (5, 6). Persistence in spraying the ragweed areas each year seems essential to prevent a return of the ragweed. Following the example of New York City, other municipalities have adopted this plan of extermination. Until all States in the ragweed zone collaborate in a determined and extensive plan, however, the hay fever victim may be somewhat benefited, but will continue to suffer, since the pollen produced by weeds many miles away can be easily transported to him by air currents.

Individual's Control of Pollen

The patient can conduct a plan of weed pollen control in his immediate environment by the installation in his bedroom or home, and in his place of business, of efficient conditioning units. Such units should filter but not chill the air, since respiratory membranes irritated and congested by pollens seem especially prone to "colds," acute respiratory infections, or sinusitis when suddenly subjected to excessively chilled air. Too, to be most effective, conditioned areas should have as their source of outside air only the conditioning apparatus, and all doors or windows should be kept closed; as little traffic as possible should be permitted into the area, since disturbing quantities of pollen may be imported upon the hair and clothing of those entering.

These measures of escape and avoidance are not altogether successful. Efforts must be made to so condition the pollen sufferer that he may continue to work and live in the pollen-containing atmosphere. This is not the time or place to discuss the therapy of hay fever—but it is pertinent to say that such treatment is based upon an attempt to increase the tolerance of the sensitized cells so that they do not react with such vigor or intensity upon exposure to the disturbing pollen. Minute, gradually increasing amounts of an aqueous extract of the specific pollen excitant are given hypodermically at weekly intervals during the period beginning 3 months before the expected season

and extending through it; or, in selected cases, larger doses administered once monthly throughout the year, though once weekly during the season, are effective (7). The use of antihistaminic drugs, of ephedrine, of soothing eye drops, of avoidance of dusts, gases, and chemical fumes contribute to the relief of the patient.

The most important step in the handling of any allergy problem is the attempt to remove the cause. This step can often be readily accomplished by the allergist if the exciting substance, identified by various tests, be an animal dander such as that of the cat or horse, causing asthma; or a food such as egg or chocolate, causing asthma or urticaria. It is impossible to accomplish if the exciting substance cannot be readily removed, being derived from widespread plant sources as in the case of an airborne pollen. Such an exciting cause is effectively reduced only at its point of origin.

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President Names Dr. Keefer Health Adviser to the Secretary

Dr. Chester Scott Keefer of Brookline, Mass., took office August 12, 1953, as special assistant, for health and medical affairs, to the Secretary of Health, Education, and Welfare. His appointment by the President was confirmed by the Senate on July 31.

The position was created in the President's Reorganization Plan No. 1 of 1953 which set up the Department of Health, Education, and Welfare. Dr. Keefer will serve as top staff policy adviser to the Secretary in important external relationships of the Department with national and international bodies concerned with health and medical matters, and will, as needed, coordinate related health and medical programs within the Department.

Dr. Keefer, who received his medical training at Johns Hopkins University, presently is a member of the Executive Committee of the Division of Medical Science of the National Research Council, and chairman of the Council's Commit-

tee of Medicine. During World War II he directed United States and Allied procurement of penicillin and streptomycin, and during 1944-46 was medical administrative officer of the Committee on Medical Research of the Office of Scientific Research and Development.

Dr. Keefer has served in key positions at Johns Hopkins Hospital, Billings Hospital at the University of Chicago, and Boston City Hospital, and has served on the faculties of Harvard Medical School and at Peiping Union Medical College. He is director of the Robert Dawson Evans Memorial Hospital. He has arranged to take leave from his position as physician-in-chief at the Massachusetts Memorial Hospital and as Wade Professor of Medicine at the Boston University School of Medicine.

M. Allen Pond, chief of the Division of Engineering Resources, Public Health Service, has been detailed to assist Dr. Keefer.

Professional Education in Public Health

— A Survey of Schools of Public Health, 1950 —

By HAROLD S. DIEHL, M.D.

Report on Schools of Public Health in the United States; based on a survey of schools of public health in 1950. By Leonard S. Rosenfeld, Marjorie Gooch, and Oscar H. Levine. Public Health Service Publication No. 276. U. S. Government Printing Office, Washington, D. C., 1953. 110 pages. Price 35 cents.

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SCHOOLS of public health in the United States have been organized in response to demands for personnel trained to perform the various health services which have been developed during the past century. The rapid expansion in both volume and scope of these services at each level of community life has increased the need for persons equipped to apply the accumulated knowledge in the biological and social sciences to the furtherance of community health. There is need for persons who can plan, organize, and administer health services; who can analyze and interpret trends in health conditions; who can identify questions that must be resolved for the improvement of public health activities; and who can conduct the research that provides a sound basis for

future developments. Accordingly, several universities have organized schools or departments of public health with varied organization and content of academic and field training. During their relatively short history, these universities have played a dynamic and essential role in public health progress.

Aware of the many complex problems that schools of public health face in their attempts to meet present demands for health personnel and to foresee the qualitative and quantitative demands of the future, the Association of Schools of Public Health asked the Public Health Service to make a study of the schools. The recently published Report on Schools of Public Health in the United States gives in detail the results of that study, describing the organization, staffing, educational programs, students, financial status, and needs of the schools of public health in 1950. This article represents a summarization of the major findings of the report.

Three Major Functions

The report presents data for the nine accredited schools of public health in operation in 1950 at the Universities of California, Michigan, Minnesota, North Carolina, and at Columbia University, Harvard University, the Johns Hopkins University, Tulane University, and Yale University. An accredited school of the University of Toronto and one established at the University of Pittsburgh in 1950 were not included in the study.

An accredited school is one that meets the standards adopted by the American Public

Dr. Diehl has been dean of medical sciences at the University of Minnesota since 1935. He received his medical degree there in 1918 and was appointed assistant professor of preventive medicine and public health in 1921, associate professor in 1924, and professor in 1929. Dr. Diehl has been a member since 1950 of the Health Resources Advisory Committee, Office of Defense Mobilization.

Health Association which set criteria for the institutions, facilities, staffing, and courses, and for the matriculation qualifications of candidates for graduate degrees in public health. These standards, as is appropriate for educational institutions in a rapidly developing field of knowledge, allow the schools wide latitude for experimentation and diversity in their approach to the three major functions which they have in common with other institutions of higher education—instruction, research, and community service.

Instruction

All schools of public health have common goals in their programs of instruction. The first of these goals is to give all students a broad understanding of the principles on which public health practice is based. The second is to train specialists in the various fields of community health services.

As a result of differences in emphasis, departmental organization and course requirements in schools of public health are less highly standardized than in institutions of some other health professions such as medicine and dentistry. All schools of public health require candidates for the degree of master of public health to take at least 2 subjects (biostatistics and epidemiology) in what may be termed the basic public health sciences and at least 2 subjects (public health administration and environmental sanitation) in applied fields of public health. Schools differ, however, in the extent to which they require or offer special training in such subjects as microbiology, nutrition, physiological hygiene, and tropical public health among the basic sciences and in such applied fields as medical economics, maternal and child health, mental health, and industrial hygiene. Thus, some schools train specialists in 1 or more of these applied fields: public health nursing, public health education, public health engineering, or hospital administration. Some schools maintain a full range of separate departments representing the various applied fields of special training; others have fewer departments which may or may not include organized subdivisions for special fields of instruction.

Research

In terms of both faculty time and expenditures, research is a prominent activity of schools of public health. The main fields of research reported by the faculty of the schools were infectious diseases, physiology, biochemistry, and environmental sanitation. The concentration of faculty time and funds on research is higher for schools of public health than for schools of medicine or dentistry.

Community Service

The community services furnished by the faculty of the schools of public health include such activities as continuation and extension courses for people outside the university, participation in consultative services, membership on committees advisory to governmental and voluntary health organizations, and services and

Table 1. Distribution of full-time and part-time faculty by department in 9 schools of public health, 1949-50

Department	Faculty			
	Total	Full-time, in school	Part-time ¹	
			Full-time in university ²	Other
All departments.....	484	232	106	146
Basic public health sciences.....	195	114	36	45
Epidemiology.....	52	21	9	22
Tropical public health.....	38	26	5	7
Biostatistics.....	32	25	3	4
Nutrition, biochemistry.....	29	18	6	5
Microbiology.....	22	14	5	3
Physiological hygiene.....	22	10	8	4
Applied fields.....	289	118	70	101
Public health administration.....	86	18	21	47
Environmental sanitation.....	34	19	9	6
Industrial hygiene.....	31	15	5	11
Hospital administration.....	22	5	6	11
Maternal and child health.....	21	15	2	4
Public health nursing.....	17	9	4	4
Public health education.....	16	10	5	1
Medical economics.....	7	6	---	1
All others.....	55	21	18	16

¹ Devoting part-time instruction, research, and other activities to the schools of public health.

² Full-time faculty of the university.

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future developments. Accordingly, several universities have organized schools or departments of public health with varied organization and content of academic and field training. During their relatively short history, these universities have played a dynamic and essential role in public health progress.

Aware of the many complex problems that schools of public health face in their attempts to meet present demands for health personnel and to foresee the qualitative and quantitative demands of the future, the Association of Schools of Public Health asked the Public Health Service to make a study of the schools. The recently published Report on Schools of Public Health in the United States gives in detail the results of that study, describing the organization, staffing, educational programs, students, financial status, and needs of the schools of public health in 1950. This article represents a summarization of the major findings of the report.

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Africa and assist the faculty in explaining these problems to other students. The training of foreign students, in turn, is a significant contribution by the schools in advancing public health practice in the countries to which the students return and in promoting international understanding. Many of the foreign students who are enrolled as special students are transferred to the status of graduate students when they have overcome language handicaps and have proved their ability to meet the requirements for degree candidates.

The graduate students of the schools of public health enter with prior education and experience in a wide variety of health fields—medicine, dentistry, nursing, veterinary science, engineering, the natural sciences, and the like.

The tabulation below indicates, for all 9 schools combined, 7 fields of study in which 30 or more students were taking majors:

<i>Major</i>	<i>Number of graduate students</i>
Public health administration-----	115
Hospital administration-----	106
Public health education-----	86
Environmental sanitation-----	64
Tropical public health, parasitology-----	46
Microbiology-----	33
Epidemiology-----	30

In this connection, attention should be called to the differences among schools in the emphasis given to special fields of instruction. One-third of all graduate students majoring in public health administration were at Johns Hopkins; nearly half of those majoring in hospital administration were at Columbia University; more than one-third of the group specializing in public health education were at the University of North Carolina, which also accounted for more than one-third of those majoring in environmental sanitation. Johns Hopkins accounted for more than one-third of the graduate students specializing in tropical public health and more than one-half of those with microbiology majors, while all but 8 of those majoring in epidemiology were at Harvard or the University of California. The different schools of public health thus tend to complement each other in providing special instruction, for no one school attempts to provide intensive instruction in the entire range of public health

subjects. This division of responsibility represents a sound, economical, and thoroughly desirable development from the standpoint of the Nation as a whole.

High Cost of Training

Public health training is expensive as compared with most other fields of higher education. The relatively small number of students, the high faculty-student ratio needed for individualized instruction, the wide variety of subjects that must be included in the curriculum, and the volume of research and community service performed by the schools all contribute to the high cost of training members of the public health profession.

In addition to the \$1.5 million expended by the 9 schools for special research projects for which funds were contributed by Federal agencies, foundations, and industry, the schools spent nearly \$3 million for basic operations in 1949-50. Almost 70 percent of the cost of basic operations was for instruction, including departmental research (table 3). The remaining 30 percent of basic operating expense was for such items as plant operation and maintenance, libraries, and administration.

Although there are distinct limitations to the validity of expressing basic operating expense in terms of cost per student, a unit cost figure has some significance in drawing comparisons among professional fields and in providing an index of the Nation's investment in professional education. This study of 9 schools of public health in the United States reveals that the average basic operating cost per graduate student was nearly \$4,200 a year, a sum substantially higher than that for training in medical schools or dental schools. Although the cost per graduate student in schools of public health is high in comparison with other fields of instruction, the aggregate annual expenditure for maintaining these schools is nominal when their significance in the national and international progress of public health programs is considered, and in relation to the total expenditures for organized health services.

For the schools of public health as a group, income from tuition and fees constituted only about 14 percent of basic operating expense.

Table 3. Basic operating expense of 9 schools of public health, 1949-50

Expense item	Total		Public control ¹		Private control ²	
	Amount	Percent	Amount	Percent	Amount	Percent
Total.....	\$2, 955, 997	100	\$1, 374, 406	100	\$1, 581, 591	100
Instruction.....	2, 034, 764	69	968, 093	70	1, 066, 671	67
Administration and general.....	475, 854	16	216, 453	16	259, 401	16
Plant operation and maintenance.....	371, 677	13	139, 742	10	231, 935	15
Libraries.....	73, 702	2	50, 118	4	23, 584	2

¹ 4 State universities.² 5 private universities.

Income from endowment represented 20 percent; gifts and grants supplied 25 percent; and the remainder came from State appropriations and transfers of funds from the parent universities.

In line with general patterns of financing higher education, institutions under public control differ greatly from those under private control in source of funds. The group of schools of public health affiliated with universities under private control receive 36 percent of their income for basic operations from endowments while the schools affiliated with State universities received only 1 percent of their operating income from that source (table 4). On the other hand, State appropriations and funds transferred from the parent university provided 71 percent of the income for basic operations for the schools in State universities as compared with 11 percent derived from that source in the schools whose universities were under private control. These findings have sig-

nificant implications in any analysis of the present financial status and long-range stability and flexibility of resources in the 2 groups of schools.

The basic operating expenses and income as defined in this study exclude the \$1.5 million separately budgeted for research projects. Federal research grants and contracts, as would be expected, represented the major source (56 percent) of these special funds in schools of public health in 1949-50. Results of this research as well as of research similarly supported by Federal grants in other schools and universities add greatly to our knowledge and understanding of factors that influence health. They find relatively prompt application in public health practice as one community after another develops or expands its health services in the light of clearer knowledge of health hazards and means of controlling them. The special research projects and the departmental research that is financed as part of the basic operations of the schools of public health not only afford

Table 4. Sources of income for basic operating expense in 9 schools of public health, 1949-50

Source of income	9 schools		Public control ¹		Private control ²	
	Amount	Percent	Amount	Percent	Amount	Percent
All sources.....	\$2, 955, 997	100	\$1, 374, 406	100	\$1, 581, 591	100
Tuition and fees.....	425, 052	14	229, 410	17	195, 642	12
Endowment income.....	577, 390	20	12, 028	1	565, 362	36
Gifts and grants.....	742, 701	25	149, 067	11	593, 634	38
State appropriations and university transfers.....	1, 161, 736	39	980, 273	71	181, 463	11
Miscellaneous.....	49, 118	2	3, 628	(³)	45, 490	3

¹ 4 State universities.² 5 private universities.³ Less than 0.5 percent.

students contact with the methods and objectives of scientific observation and analysis but also enhance their skills in applying the research findings in the work they do when they leave the school.

Needs of the Schools

The serious postwar financial difficulties of institutions of higher learning have been widely recognized. Increasing costs, expanding responsibilities, improving standards, and decline in the share of income available from endowment and private philanthropy are among the factors contributing to these difficulties. The study of schools of public health collected information that provides a quantitative estimate of the unmet needs of these schools.

According to the judgment of the deans and others responsible for the administration of these 9 schools of public health, the schools must have additional full-time faculty and expanded or renovated physical plant and equip-

Table 5. Departmental requirements for additional full-time faculty in 9 schools of public health, 1949-50

Department	Number additional full-time faculty needed	Percent increase over present full-time faculty
All departments-----	131	56. 5
Basic public health sciences-----	29	25. 4
Epidemiology-----	8	38. 1
Microbiology-----	5	35. 7
Biostatistics-----	4	16. 0
Nutrition, biochemistry-----	4	22. 2
Physiological hygiene-----	4	40. 0
Tropical public health, parasitology-----	4	15. 4
Applied fields-----	102	86. 4
Public health administration-----	16	88. 9
Maternal and child health-----	15	100. 0
Industrial hygiene-----	8	53. 3
Public health nursing-----	8	88. 9
Environmental sanitation-----	6	31. 6
Medical economics-----	6	100. 0
Public health education-----	5	50. 0
Hospital administration-----	2	40. 0
All other-----	36	171. 4

ment to meet standards of adequacy and to expand their efforts in new fields of desirable public health training. A substantial increase in faculty was considered essential in nearly all schools, representing need for an increase of 25 percent over the available number of full-time faculty in departments of basic public health sciences and of 86 percent in those representing applied fields (table 5). In most schools, the physical plants were considered inadequate, with overcrowded classrooms and laboratories. For all 9 schools combined, it was estimated that nearly \$2 million of additional annual income for basic operations was needed, while the aggregate need for construction and equipment was \$11.5 million.

Conclusions

The study summarized here and the companion Public Health Service studies of medical schools (1) and schools of dentistry (2) are significant contributions to knowledge of the financial and related problems of education for the health professions. This report, moreover, goes farther than the other two, in that it relates the development of schools of public health to trends in community health services and describes the adjustments being made by the schools to gear public health training to new health problems or to those that assume increasing proportions with advances in control of acute communicable diseases. Thus, in accord with the changing spectrum of health hazards, the schools of public health are attempting to expand their instruction and research in the field of chronic illness, mental health, and geriatrics. In response to broadening concepts of the interrelationships of physical and mental health with economic conditions and socioenvironmental factors, an effort is being made to strengthen the resources of the schools in such areas as sociology and economics. In keeping with the widening responsibilities of public and private health agencies, the schools are broadening the content of their educational programs in public health administration, medical care administration, and world health problems.

If they are to continue to set the pace for progress in public health knowledge and prac-

tice, the schools must be able to develop and adjust their programs and resources to changing health concepts, needs, practices, and organization. Dr. Lowell J. Reed, now president of the Johns Hopkins University, writes in his preface to the report:

"Professional education in public health, a relative newcomer in the broad field of education in the health professions, has been characterized by independent thought, active experimentation, and a wide diversity of approach. This experimentation provides a rich fund of experience on which to draw in evaluating the effectiveness of education in public health and in projecting future trends of development. It must continue if education in this field is to retain its place as a vital part of the structure of health services."

A broad public understanding of the origin,

development, purposes and significance of the schools of public health in the structure of the Nation's health services, such as can be gained from this report, should greatly assist the schools in meeting the ever-increasing demands being placed on them.

REFERENCES

- (1) U. S. Public Health Service: Medical school grants and finances. Part I. Conclusions and recommendations. Part II. Financial status and needs of medical schools. Part III. Public Health Service grants. Their distribution and impact on medical schools. Public Health Service Publications Nos. 53-55. Washington, D. C., United States Government Printing Office, 1951. 48, 85, and 85 pp., respectively.
- (2) U. S. Public Health Service: Financial status and needs of dental schools. Public Health Service Publication No. 200. Washington, D. C., United States Government Printing Office, 1952. 83 pp.

Assistant Secretary Appointed

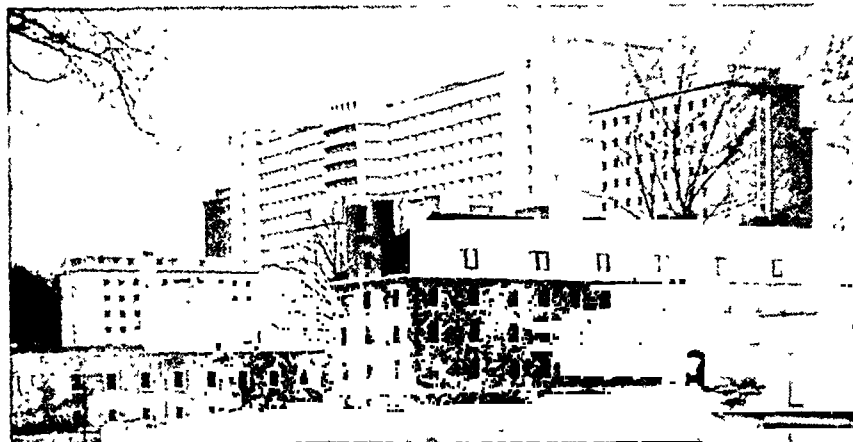
Russell Raymond Larmon, specialist in economics and business administration, has been named Assistant Secretary of Health, Education, and Welfare. His appointment was confirmed by the United States Senate July 21, 1953.

A graduate of Dartmouth College, Mr. Larmon served 4 years as executive assistant to the president of Dartmouth, and since 1934 has been a professor at the college in the field of administration.

He has served as a consultant to several business organizations on top management policy and has held board membership in a number of organizations. Mr. Larmon has also served on New Hampshire State commissions and was consultant to the governor on the organization of a State store system, the Department of Welfare, and other matters of State administration. From 1942-44, he was the director of the New Hampshire State Office of Price Administration.

A veteran, Mr. Larmon served with the United States Navy from 1917-18. He is a resident of Hanover, N. H.

The U. S. Public Health Service Clinical Center



for laboratory and clinical research
in medicine and public health

Symbolic as the shape in which it is built—that of the cross of Lorraine—is the role destined for the new Clinical Center of the National Institutes of Health, the research arm of the Public Health Service in the Department of Health, Education, and Welfare. Here those who travel the paths of laboratory and animal research and clinical investigation will meet and intermingle. Clinical evaluation will flow directly and naturally from basic findings. Laboratory assessment will be immediately available for phenomena observed at the bedside. Knowledge and techniques peculiar to dozens of clinical and scientific specialties can be harnessed to a single problem. These are not new concepts nor new attempts, but they are significant in scope and intensity. There is nothing random in the aim of this research institution. The Center exists to increase the pressures on the points which suggest potentially greatest returns toward the goal of making human lives longer and more productive.

These pages provide some descriptive details of this new research resource, supplementing material published in August 1952 (pp. 819–

823) and with the frontispiece of the August 1953 issue. Following the general “question and answer” and illustrative material will be found the full dedicatory address of the Secretary of Health, Education, and Welfare and excerpts from remarks of the Surgeon General and the director of the National Institutes of Health.

The Clinical Center of the Public Health Service, Department of Health, Education, and Welfare, is an integral unit of the National Institutes of Health, located in Bethesda, Md., approximately 8 miles from the center of Washington, D. C.

The Clinical Center’s construction was authorized in the Public Health Service appropriations act for fiscal year 1948, and its doors opened for admission of study patients July 1, 1953.

Background

Q. How did the concept of a Clinical Center within the Public Health Service arise?

A. The proposal for a “research hospital” where results obtained from laboratory investi-

tice, the schools must be able to develop and adjust their programs and resources to changing health concepts, needs, practices, and organization. Dr. Lowell J. Reed, now president of the Johns Hopkins University, writes in his preface to the report:

"Professional education in public health, a relative newcomer in the broad field of education in the health professions, has been characterized by independent thought, active experimentation, and a wide diversity of approach. This experimentation provides a rich fund of experience on which to draw in evaluating the effectiveness of education in public health and in projecting future trends of development. It must continue if education in this field is to retain its place as a vital part of the structure of health services."

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Investigations of high blood pressure. A large number of patients will be studied over a long period to observe the natural history of the condition and to find better therapeutic agents or procedures. The hypertensive patients selected for study will probably remain in the Clinical Center for about 1 month for thorough initial study and then return for 2 or 3 days at monthly intervals for followup observation or treatment. Because of the complexity of the medical problem, a great number of laboratory and special research studies will be required in the evaluation of patients. Blood chemistry studies of the most exhaustive types will be carried out, as will metabolic studies with particular reference to diet and drugs.—*National Heart Institute.*

Studies of the periodontal diseases. These investigations will involve such problems as reattachment of tooth-supporting structures which have become detached or loosened by diseases of the soft tissues of the mouth.—*National Institute of Dental Research.*

Q. What is the relationship between laboratory scientists and clinical investigators in the conduct of research?

A. One of the major goals of the Clinical Center is to bring together in close intellectual and physical proximity virtually all of the clinical and laboratory disciplines. Scientists representing many specialties will be afforded opportunity to exchange ideas and information not only in the course of their studies, but also through casual and informal contacts.

Q. What is the relationship among the various Institutes conducting studies in the Clinical Center?

A. The collaborative nature of much research at the National Institutes of Health will be a significant factor in the overall research program relating to the Clinical Center. Many studies must cut across Institute lines. Hypertension, for example, is not a problem confined to the Heart Institute. It is thought to extend directly into the areas of metabolic and emotional disturbances, and so the study of this entity may involve at least three Institutes. In the Clinical Center, study patients of the seven

Institutes will receive patient care services from the Clinical Center central staff. Thus, the patient care facilities of the Clinical Center become a service to be shared in common by the several research programs.

Q. What is the relationship of outside investigators to the Clinical Center?

A. The Public Health Service will provide opportunities for a limited number of established scientists from other research institutions to work in the Clinical Center, usually for a year or less, on problems of their own choosing. They will be furnished space, equipment, technical help, and professional collaboration. Training opportunities will also be made available to young laboratory scientists and to physicians who have finished general internship and 2 years of residency training, thus enabling them to obtain specialized preparation for careers as independent investigators.

Q. What radiation facilities does the Clinical Center provide?

A. To study the diagnostic and therapeutic application of ionizing radiations, the Clinical Center will devote one entire wing, three stories underground and five above, to radiation therapy and research. Special safety features have been incorporated into the design of this wing—shielding, special ventilating and plumbing, and special laboratory equipment and floor surfaces. A unique feature of the radiation wing is the provision of rooms for patients, making possible supervised control of radioisotopes for diagnosis and treatment. Special laboratories in the radiation wing will be used to prepare medications containing radioisotopes, and for their subsequent extraction, purification, and chemical analysis from excretions and tissues.

Q. What can we expect from the Clinical Center research program?

A. The Clinical Center represents an important addition to the Nation's medical resources. It must be remembered, however, that advances in medical science are gradual and represent the cumulative efforts of thousands of scientists and physicians throughout the world. The Clinical Center is a highly developed laboratory.

Its specialized and diversified staff should help bridge the gap between laboratory and clinical research, and between the various special branches of medical science.

Q. Does the Clinical Center train interns and student nurses?

A. No. However, "clinical fellows" who are the equivalent of second- or third-year residents in the ordinary hospital, may qualify for several of the specialties through service in the Clinical Center. Similarly, graduate nurses will receive special training in the care of patients in broad disease categories and in clinical research nursing.

The Research Patient

Q. What are the standards of admission for patients under study at the Clinical Center?

A. Because research is the main function of the National Institutes of Health, the patients admitted to the Clinical Center by a given Institute must meet the terms of investigation as set by that Institute. He must, therefore, *be chosen for admission* as a subject who has those characteristics of a disease or disorder about which National Institutes of Health scientists are asking questions and hope to find the answers. On occasion, a limited number of "healthy" persons will be admitted in order to establish the normal against which the pathological can be measured. No study patient will be admitted unless he is referred through professional channels.

Q. How will it be determined that patients are suitable for study purposes?

A. The Institutes will ask physicians, hospitals, and clinics to refer to them those patients who appear to meet the needs of particular studies. The diagnosis of the patient by his attending physician and further diagnostic checks at the Clinical Center itself will be of paramount importance in determining suitability of patients for Clinical Center admission.

Q. Will patients with rare diseases or diseases which have not been diagnosed qualify for admission?

A. As a general rule—no.

Q. Where will patients be drawn from?

A. It is believed that most patients will be obtained from the eastern seaboard States (a) as a matter of convenience to patients, their families, and their doctors, (b) in order to facilitate medical followup, and (c) in order to reduce the cost of transportation. Under certain circumstances, especially when the condition to be studied is not prevalent in this area, it will be necessary to admit patients from more distant places.

Q. How long will patients remain in the Clinical Center?

A. This will depend on the nature of the study and the condition of the patient. Some studies may require that patients remain under observation for 6 months to a year. Studies of the acute infectious diseases, however, may require a stay of only a few days to a few weeks.

Certain investigations will require that patients remain at the Clinical Center for several weeks of study, then report periodically to the Center on a followup basis for long periods of time. In a limited number of studies, patients will not be admitted to the Clinical Center as bed patients but will report on a regular basis to the research teams for observation and tests.

Q. Are there any special facilities for care of the long-term patient?

A. The Clinical Center has been built with the understanding that hospitalization for prolonged study demands special facilities. Each room will normally have two patients, except when the condition of the patient requires a private room (as in the case of certain psychiatric studies or patients with infectious diseases). The entire building is air-conditioned, and each patient room has a complete bathroom. On each floor is a solarium with comfortable lounges and chairs for patients and their visitors. Indoor and outdoor recreational facilities have been provided, and a library will be available for patients. It is expected that concerts and movies will be presented in the patients' assembly room on the top floor. Protestant, Hebrew, and Catholic services are

to be conducted regularly in the Center's chapel.

Q. Who will be the patient's physician while he is in the Clinical Center?

A. Each patient will have as his physician a qualified clinician from the Public Health Service staff. He will perform the full range of services and assume the responsibilities of the personal physician for the duration of the patient's stay in the Clinical Center.

Q. What is the relationship of the patient's own physician to the patient while in the Clinical Center and afterward?

A. The patient's own physician will be welcomed in the Clinical Center to visit the patient and confer with the staff. Full reports on each patient will be made at suitable intervals

to the referring physician or institution. On discharge, the patient is referred back to his physician or institution, or both, and the results of treatment and recommendations for further therapy, if desired, will also be made available. In cases requiring followup observation and therapy, appropriate arrangements will be made with the patient's physician.

Q. Does the Clinical Center have medical facilities available for routine treatment of persons in the local area?

A. No. The Clinical Center operates solely as a research facility. The only exception—as is true of all hospitals and clinics—will be the treatment of emergency cases, such as victims of nearby automobile accidents. Such patients will be transferred to the regular general hospitals of the area as soon as it is safe to do so.

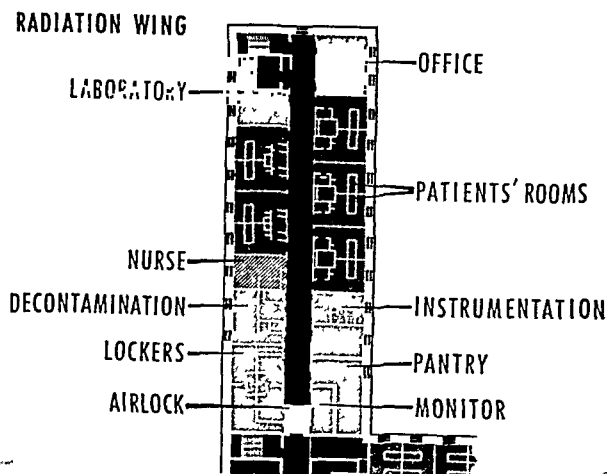
The Clinical Center Structure

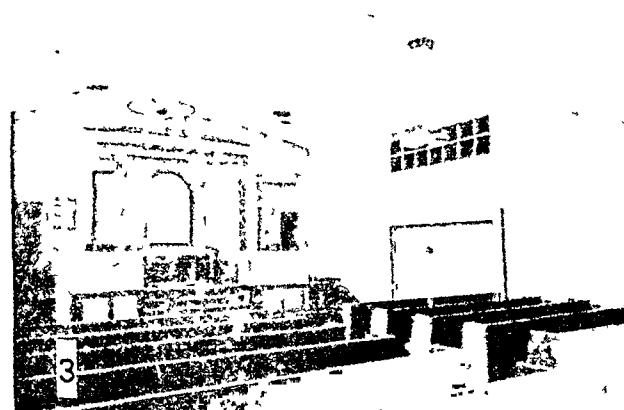
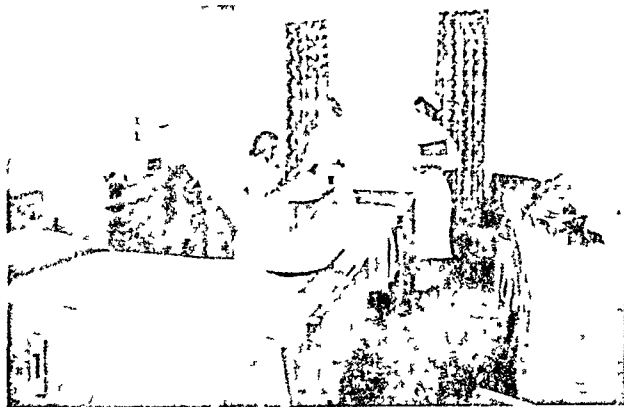
The Clinical Center is designed in the shape of a Lorraine cross in which the central stem of 14 floors is divided lengthwise by 2 corridors. Rooms for patients are located on the south side, separated by a corridor from nursing and related patient services. Clinical research laboratories are along the north corridor. Fundamental research will be conducted in the 6 wings, each of 11 floors. One of these wings (see drawing) is designed especially for radiation studies.

[For schematic floor plans showing the interrelationships between facilities for patients and the clinical and basic laboratory space, see *Public Health Reports*, August 1952, p. 821.]

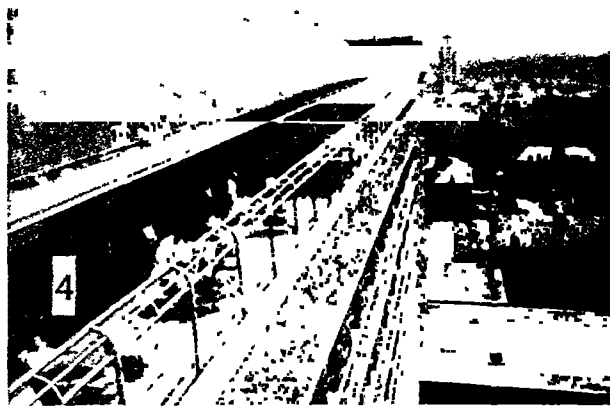
Patients are cared for in 2 nursing units on each floor, with 13 rooms and a capacity of 26 patients. Typical rooms (see picture 1) are 17 feet long by 11½ feet wide. The nursing station (picture 2) is centrally located in each unit and equipped for economical and efficient service, including voice communication with each patient.

With the welfare of the study patient as a primary consideration, facilities have been provided to make their stay in the Clinical Center as comfortable to them as practicable. A chapel (picture 3) provides regular Protestant, Hebrew, and Catholic services, and clergymen of each faith have offices in the Center. Recrea-





tional facilities are available. Each floor has a solarium for patients which is reached by connecting corridors separate from the laboratory and general public spaces in the building. A



sun deck (picture 4) looks over the rolling hills of Bethesda. Other buildings on the grounds of the National Institutes of Health may be seen, with the National Naval Medical Center in the background.

In addition to 500 beds for study patients, the Clinical Center contains some 1,100 12-by 20-foot modules in the laboratory areas. Flexibility in research space is provided by demountable partitions (picture 5). Laboratory utilities—illuminating gas, vacuum, distilled and hot and cold water—come up the main walls every 12 feet. Plumbing in the partitions brings utilities to the benches and sinks. One of the clinical laboratories, ranged along the north side of the main stem, is shown in picture 6. This is a 2-module unit. Picture 7 shows a 1-module unit in one of the laboratory wings provided for basic investigations.

Several ancillary buildings (picture 8) service the Clinical Center and other units of the National Institutes of Health. Heating, air-conditioning, and a plant for emergency power production are provided in one building. Adjacent are shops, storage, and laundry buildings; incinerator; animal buildings; a grounds maintenance building; and a general utility building. A tunnel permits materials to be transported directly from shops and storage bins to research space in the Clinical Center without the necessity of reloading carts and



trucks. Auxiliary functions are placed in service structures outside the Clinical Center to reduce construction costs and to avoid uneconomical use of research space, as well as to reduce such factors as smoke, traffic, and maintenance activities in the Center itself. An apartment building (containing, for the most part, efficiency apartments, but with a small number of 1- and 2-bedroom units) is still under construction immediately adjacent to the Clinical Center. It will provide housing for medical, nursing, engineering, and maintenance staff whose duties require them to be available for emergency calls.

The Clinical Center building program (which includes, in addition to the Center itself, the various auxiliary structures, land, roadways, storm sewers, and so forth) on completion, fully equipped, will represent a total investment of approximately \$64 million. Rough breakdown is as follows: \$3.5 million—site acquisition and original plans; \$34 million—the Clinical Center building itself; \$8 million—laboratory equipment and initial supplies; \$17.5 million—fully equipped auxiliary structures (boiler plant, shops, laundry, warehouse, animal facilities, chemical storage, grounds maintenance, isotope laboratory, and general utility building); \$1 million—apartments for resident



staff performing emergency patient-care duties.

The Clinical Center itself contains 1,266,400 square feet gross, of which 55 percent is net space.

"A Symbol of Our National Concern For the Health of Our People"

Address of Oveta Culp Hobby, Secretary of Health, Education,
and Welfare, in dedication of the Public Health Service
Clinical Center July 2, 1953, at Bethesda, Md.

It is impossible to stand here today without a feeling of tremendous excitement—the excitement one always feels in the face of an infinite potentiality.

In his book entitled "Death Be Not Proud," John Gunther wrote courageously and beautifully of the gradual death of his son Johnny from a brain tumor. One passage I shall always remember was this: "People may ask if it would not have been better if we had had fewer doctors and less treatment. Perhaps we tried to do too much. But Johnny loved life desperately and we loved him desperately and it was our duty to do absolutely everything and keep him alive as long as possible. Always we thought that, if only we could maintain life somehow, some extraordinary *new* cure might be discovered."

No human being who has ever loved another human being can fail to understand the urgency that hour by hour, minute by minute, the Gunthers felt as they fought off death for their brilliant, endearing son.

The cure did not come in time for Johnny Gunther nor for tens of thousands of others who have the so-called incurable diseases.

New Solutions Ahead

But with the opening of this Center today, we can envision cures as yet unthought of which will bring life to the desperately ill, which in their hour of need will ease the desperation of parents whose children are as yet unborn.

Each new solution to be found here will mean a new chance at the full and finished life for numberless men, women, and children—each

one a human being who loves life, each one loved by someone else.

The opening of this Center today in no way minimizes the work of the solitary research scientist working alone. It will aid him and the forces of research scattered across the country.

This Center will provide a focal point for all who inquire—for all who seek sources of life and the causes of death.

This is a practical step, taken by our Government as trustee for the people, toward the threefold goal of improving the health, education, and welfare of our citizens. It will better public health by hastening the conquest of disease; it will widen the bases and the horizons of medical education, and in both these ways it will contribute to the general welfare of the Nation.

A Collaborative Effort

The purpose of the Center—to facilitate and improve medical research—is part of a research program which has gained spectacular impetus since World War II. We are now carrying on in the United States the most intensive and widespread research attack on human disease which the world has ever seen. It is a collaborative effort—a close partnership between the Federal Government and the medical, research, and related professions, universities and medical schools, and numerous nationwide organizations of citizens. Every year the effort widens, as new and old organizations concentrate on specific killers of mankind.

The part played by the Federal Government in this intensive research program is an important one. In fact, half of all research in

medical schools is now financed by the Federal Government. This Department now supports seven research institutes, all of them located at Bethesda. In 1953 Public Health Service grants and related training activities totaled \$22.5 million. This investment has contributed dividends to the kind of medical knowledge which, since 1900, has helped to lengthen our national life span by about 20 years and has taught us how to control or eliminate diseases which once were national scourges.

For example, it was a Public Health Service doctor who discovered that pellagra was a dietary deficiency disease, thus leading to its final conquest. Here, in these Federal research institutes, Rocky Mountain spotted fever was identified and a vaccine against it discovered. Here were made early discoveries about Q fever, and here a vaccine against typhus fever was found, a knowledge which has saved the lives of countless numbers of our troops.

Milestone of Progress

The Clinical Center which we are dedicating today is a milestone—a very big milestone, as you can see—on this road of progress. By this joining, under one roof, of hospital, clinic, and research laboratories, the research scientists are acquiring a new and powerful tool in their endless struggle to unlock the stubborn secrets of disease and build a better life for all of us.

The need for uniting clinical studies more closely with laboratory research was first voiced by the Surgeon General of the Public Health Service as long ago as 1911: "The time has now come when in order to obtain the best results from laboratory work there should be available a hospital attached to the laboratories to which patients suffering from a particular disease which it is desired to study could be admitted, so that the cases could be studied throughout all the stages of the disease." He had the vision, but it has taken 42 years for that vision to materialize into this reality.

Initial funds for building this Clinical Center were finally authorized and the first money appropriated in 1947 by the 80th Congress, and you see the result here today. It is not only a symbol of man's untiring search for knowledge and a better life. It is a monument of

what can be accomplished when there is unity of purpose and free cooperation toward a worthwhile goal.

For the Clinical Center is in no sense a partisan, politically inspired enterprise. Though funds for its construction were voted by a Republican Congress, the vote was on a nonpartisan basis, with both Republicans and Democrats supporting it.

The late beloved Congressman Frank B. Keefe of Wisconsin was its principal champion in the House, and his success in winning nonpartisan support was shown when the measure passed without a single dissenting vote.

In the Senate, Senators Styles Bridges of New Hampshire and William Knowland of California were among its skillful and successful backers. There, too, it won support from both major parties.

The reason for this nonpartisan approach toward the Clinical Center and toward similar measures to improve the Nation's health is not hard to find. For the Center is an instrument in the unceasing search of science for truth, and scientific truth knows no politics—at least in a free society.

A Unique Structure

As you can see, the building itself is a unique structure. Built in the shape of a Lorraine cross, it is really a set of laboratories wrapped around a 500-bed hospital. No more dramatic revelation of the complexity of modern medicine could be devised than the fact that a structure as large and complicated as this is necessary to bring together all the trained doctors and scientists needed for a full-scale attack on the diseases which are being studied here.

The building has been designed to have the utility and flexibility necessary to meet the ever-changing requirements of laboratory research, patient care, and sound administrative practices.

Patients who come here will have medical care as good as any in the world. The most advanced research techniques will probe into the causes and attempt to find ways of curing and preventing the diseases from which they suffer.

This will be far more than simply another

Federal hospital. All its patients will be referred by medical sources and chosen on the basis of their relation to the disease problems currently under study at the Center. They may remain in the hospital for long periods of time, and after they are discharged, they will be observed closely for periods ranging from a few months to 10 years or more. Their welfare will at all times be the first consideration.

A National Institution

The Clinical Center will be a truly national institution—an invaluable asset which will enrich the resources of our universities and medical schools and a laboratory where scientists from other countries can pursue their studies, thus widening not only their own knowledge but ours. But this Clinical Center's meaning, it seems to me, goes deeper than that. It is a logical outcome of the original concept of this country held by the men who founded it.

These men used powerful phrases to express their concept—phrases which are as strong and vigorous today as when first written a century and three-quarters ago.

From the Declaration of Independence, "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness."

Will not this Center strengthen human hold on life and make easier the pursuit of happiness?

And from the Constitution, "We, the people of the United States, in order to form a more perfect Union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity . . ."

What single institution could be expected to do more for the general welfare or to secure the blessings of liberty to ourselves and our posterity?

This Center is the way responsible government—as trustee for the people—fulfills the obligation placed upon it by the Constitution.

It is new evidence that the United States Government continues to be responsive to the people and to the needs of the people.

I proudly dedicate this Center to medical research as a symbol of our national concern for the health of our people, for their right to pursue happiness unhampered by crippling pain and illness.

In freedom, this building and the people who work here are dedicated to the endless struggle against human suffering.

We are dedicating it today—dedicating it to the open mind of research—dedicating it as an example of democracy heeding its obligation to free men, who, together, are self-governing.

Additional Details

. . . concerning Clinical Center operations and policies will be found in three new publications of the Public Health Service.

The National Institutes of Health Clinical Center

Public Health Service Publication No. 316.
1953. 32 pages; illustrated. 10 cents.

The Clinical Center: Current clinical studies and patient referral procedures

Public Health Service Publication No. 284.
1953. 3-fold leaflet.

Handbook for Patients at the Clinical Center

Public Health Service Publication No. 315.
1953. 16 pages; illustrated.

Publication No. 316 is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The other publications may be obtained on direct request to the Public Health Service Clinical Center, Bethesda 14, Md.

"We must press the search for new knowledge ... use what we know more effectively"

Extracts from remarks of the Surgeon General of the Public Health Service at the dedication of the Clinical Center.

The opening of the Clinical Center symbolizes the hope and faith of the American people that the major killing and crippling diseases of this century ultimately will be conquered.

The very nature of these diseases—subtle reactions of the human organism to its biological inheritance, its total environment—makes it clear that clinical and laboratory research will play an increasingly significant role in medical and public health progress for many years to come.

In a sense, we have reached a period of consolidation of forces for a broad attack on chronic diseases—an attack that can be fully successful only after years of intensive research. This means that we must not only press the search for new knowledge, but we must also use what we do know more intensively, more effectively.

The key to chronic disease control today is early diagnosis and treatment. Hundreds of thousands of the people who will die of cancer or heart disease, or who will be permanently disabled by arthritis or neurological disorders, or mental disease, could be aided if their illnesses were detected in the early stages when present methods of treatment are most successful. The first great promise of medical research is to find new and more efficient ways to early diagnosis and treatment. And the second is ultimately to discover means of positive prevention.

In centering attention on the chronic diseases, we will not forget that our knowledge of infectious diseases—particularly the virus infections—is really quite rudimentary, when measured against what must be known if prevention is to be as successful in the whole range of communicable diseases as it now is in a few. We must not forget the interrelation of many acute

infections and chronic disability: the crippling effects of poliomyelitis and encephalitis, for example.

If the Nation's total effort in medical and public health research maintains effective balance and emphasis with respect to all our major problems, the American people can expect advances in human health in the second half of this century as startling as those that have marked the first half.

The Clinical Center will take its place with other major research institutions, private and public, in this long, hard fight.

The Clinical Center, however, is not only a research institution; it is a piece—a large one, it is true—in the kaleidoscope of public health. It is a part of the Public Health Service, and thus a part of the United States Department of Health, Education, and Welfare.

We in the Public Health Service, and our colleagues both inside and outside the Federal Government, have long since recognized the inseparability of science and the society in which it functions. We cannot separate a rheumatic child's illness from his growing mind and body, from his immediate need for schooling, his family's potential need for social service. Nor can we separate the cancer patient's disease from his age, his potential unemployability, or his pension. We cannot separate the crippled workman's paralysis from his chances for rehabilitation and return to gainful employment and happy independence.

The opening of the Clinical Center follows by less than 2 months the establishment of the Department of Health, Education, and Welfare—acts which demonstrate America's nationwide recognition of these relationships. . . .

—LEONARD A. SCHEELE, M. D.

"An atmosphere of excitement, of high expectation and a knowledge . . . of serving mankind"

Extracts from remarks of the director, National Institutes of Health, at the dedication of the Clinical Center.

The United States now has a medical research establishment as fine as any in the world. This building, in its unique and original design, supplies the facilities that are essential for the close interworking of clinical and laboratory research scientists which is required by the intricacies of the search for the cause and treatment of diseases such as heart disease, mental illness, cancer and the other killing, crippling, and chronic diseases with which we will be working. The Clinical Center will make possible research of a very high caliber: our real job now begins.

Medical research is an intellectual pursuit. Its success depends entirely on the capability of the individual. If we are to succeed in this great undertaking, we must continue to attract staff of the highest professional qualifications and continue to maintain an environment in which scientific excellence is the major value. We want to create in this building the atmosphere of excitement, of high expectation and a knowledge of the happiness that can be achieved in serving mankind—the things that are common to all great research institutions.

We want our patients to feel they are our colleagues in research and to experience this same atmosphere. They will receive the best care that medical science can provide. Our

moral obligation to do our best to treat the sick is paramount. Clinical studies will go forward within limits set by the welfare of patients. Not only is this a moral imperative—but it is the only way that sound clinical research can be done. These objectives and principles will guide the National Institutes of Health.

In extending our research organization we face the complex problem of establishing the proper relative emphasis upon laboratory and clinical research. We will fail if clinical research overshadows or replaces laboratory work, and we must insure that clinical observations are fully developed in the laboratory.

To those who are not acquainted at first hand with the operation of a research organization these problems may seem abstract. To those who are familiar with the problem I need say no more.

As we today dedicate this building we are merely saying—this is the beginning. We deeply appreciate the faith that the Congress has shown in our assurances that this great investment in medical research will pay off in benefit to the health and welfare of the people of the United States. It will be our job now to make good those assurances. . . .

—WILLIAM H. SEBRELL, JR., M.D.



Health Department Manpower

In the spring of 1951, the Public Health Service collected information concerning personnel employed and vacancies in positions for professional and technical public health workers in State and local health departments of the continental United States and the Territories. This was done at the request of the Health Resources Advisory Committee of the Office of Defense Mobilization, a committee appointed to consider the availability and use of health resources, including personnel, during the period of defense mobilization. The information obtained was reported to the committee at two of its meetings in the winter of 1951-52, and was the subject of an article by Dr. William P. Shepard, a member of the committee, published in the *Public Health Reports* for August 1952. Final analysis of all data collected and source material for reference purposes have been included in Public Health Monograph No. 13, entitled "Staffing of State and Local Health Departments, 1951."

No later comparable data are available to provide a basis for determining whether the staffing problems of State and local health departments have eased in the past 2 years. From reports on personnel submitted periodically to the Public Health Service by State health departments, the assumption that the personnel situation is still critical appears to be justified. Recruitment of qualified public health workers still lags far behind needs. Established positions that were vacant in the spring of 1951 are, in many instances, still vacant. The "doubling up" of assignments, the discontinuance of programs and services, and the search for candidates for employment continue.

Vacancies in budgeted positions reported by State and local health departments represent only immediate and urgent needs for particular categories of public health personnel. They by no means indicate the extent of total need, even for minimum staffing requirements. To



Public Health

MONOGRAPH

No. 13

The accompanying summary discusses the principal findings presented in Public Health Monograph No. 13, published concurrently with this issue of Public Health Reports. The authors are with the Bureau of State Services, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

• • •

Haldeman, Jack C., Cheney, Bess A., and Flook, Evelyn: Staffing of State and local health departments, 1951. Public Health Monograph No. 13 (Public Health Service Publication No. 279). U. S. Government Printing Office, Washington, 1953. Price 30 cents.

bring existing health department staffs up to the recommended minimum standards would require the services of many more public health workers than the number needed to fill reported vacancies.

Among the personnel employed at the time of the survey, many held status in the various components of the military reserve; many physicians, dentists, and veterinarians had been registered and assigned priorities under

the "Doctor Draft Law"; and many more were in the older groups, approaching an age when, even though still actively at work, the services they are able to render must be expected to decline both in quantity and quality. In a national emergency, in which large numbers of trained public health workers would be needed urgently and on short notice, it seems evident that State and local health departments would of necessity be stripped of many of their able-bodied staff members.

For budgeted positions and vacancies, information is available from 1,257 local and 44

State health departments in the United States. For personnel employed in 1951, reports cover 1,470 local and all 48 State health departments. Information is provided for the continental United States as a whole and divided among four broad geographic regions, according to type of department—county, city, local health district, State health district, or other—and according to the population served—in communities of under 35,000 to those of half a million or more. Generally comparable data from the Territories—Alaska, Hawaii, Puerto Rico, and the Virgin Islands—are also included.

To the Professional Public Health Worker

You, like the specialist in medical and other fields of science, know how important it is to be informed on current knowledge in your specialty. And, for the most part, you rely on the first-hand availability of the leading journals and periodicals in your specialty.

But as more becomes known of public health practice and research, the more complex this science becomes. There comes too the need to relate the activities of all its component disciplines—the members of the family of public health—one to the other, and each to the whole. And for each specialist there is a need to read regularly the journals devoted to unifying the family of public health. *Public Health Reports* is such a journal.

For Your Personal Copy of



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Trends in Tuberculosis Mortality In Continental United States

By ALBERT P. ISKRANT, M.A., and EUGENE ROGOT, B.S.

THE NUMBER of deaths and the death rate from tuberculosis continue to decrease very rapidly in the United States. In 1950, there were 33,959 tuberculosis deaths, a decline of 13 percent from the number in 1949. The death rate per 100,000 population for 1950 was 22.5, a decline of 14 percent from the rate for 1949. Further declines were realized in 1951 and in 1952. Estimated figures for 1951 show declines from 1950 of about 13 and 15 percent,

respectively, in the number of tuberculosis deaths and in the death rate; similar declines are noted for 1952 in comparison with 1951.

The yearly changes in the number of deaths and in the death rate in the United States for 1933 through 1952 are shown in table 1. (In this table and throughout the report, numbers of deaths for 1940-52 exclude deaths among Armed Forces personnel overseas, and rates are based on population excluding the Armed Forces overseas.) The striking downward trend in the tuberculosis mortality rate was interrupted only once in this period, in 1936. In recent years the rate of decline has accelerated. Since 1945, the tuberculosis mortality rate has been reduced by 60 percent. It is interesting

Mr. Iskrant is chief of program analysis in the Division of Chronic Disease and Tuberculosis, Public Health Service. Mr. Rogot is an analytical statistician with the division.

Table 1. Number of deaths and death rates from tuberculosis (all forms), in continental United States, 1933-52

Calendar year	Number of deaths	Percent-age decline from preceding year	Death rate per 100,000 population	Percent-age decline from preceding year	Calendar year	Number of deaths	Percent-age decline from preceding year	Death rate per 100,000 population	Percent-age decline from preceding year
1933-----	74,842		59.6		1943-----	57,005	1.2	42.6	1.2
1934-----	71,609	4.3	56.7	4.9	1944-----	54,731	4.0	41.3	3.1
1935-----	70,080	2.1	55.1	2.8	1945-----	52,916	3.3	40.0	3.1
1936-----	71,527	¹ 2.1	55.9	¹ 1.5	1946-----	50,911	3.8	36.4	9.0
1937-----	69,324	3.1	53.8	3.8	1947-----	48,064	5.6	33.5	8.0
1938-----	63,735	8.1	49.1	8.7	1948-----	43,833	8.8	30.0	10.4
1939-----	61,609	3.3	47.1	4.1	1949-----	39,100	² 7.1	26.3	² 8.7
1940-----	60,428	1.9	45.8	2.8	1950-----	33,959	13.1	22.5	14.4
1941-----	59,251	1.9	44.5	2.8	1951 ³ -----	29,492	13.2	19.2	14.7
1942-----	57,690	2.6	43.1	3.1	1952 ⁴ -----	25,080	15.0	16.1	16.1

¹ Denotes increase.

² Figures adjusted to allow for differences between the fifth and the sixth revisions of the International List of Causes of Death. Provisional comparability ratio (sixth revision : fifth revision) of 0.96 used.

³ National Office of Vital Statistics: Annual summary, 1951, 10-percent sample of death certificates. Current Mortality Analysis, vol. 9, No. 13, 1952, p. 12.

⁴ National Office of Vital Statistics: 10-percent sample for 1952. Monthly Vital Statistics Report, vol. 2, No. 1, 1953, p. 6.

Table 2. Mortality from tuberculosis (all forms), by age, expanding Death Registration States; 5-year intervals, 1900-1935; annually, 1935-50

Calendar year	Number of deaths			Rate per 100,000 population			Percent of deaths		
	Total ¹	Under 45 years	45 years and over	Total ¹	Under 45 years	45 years and over	Total ¹	Under 45 years	45 years and over
1900-----	38,820	29,244	9,499	194.4	185.0	228.6	100.0	75.3	24.5
1905-----	39,168	29,565	9,537	179.9	172.2	207.2	100.0	75.5	24.3
1910-----	73,028	53,934	19,047	153.8	143.8	191.4	100.0	73.9	26.1
1915-----	86,726	63,006	23,635	140.1	129.7	177.5	100.0	72.6	27.3
1920-----	97,366	70,565	26,650	113.1	104.5	143.8	100.0	72.5	27.4
1925-----	86,510	61,042	25,324	84.8	76.8	112.4	100.0	70.6	29.3
1930-----	83,352	56,443	26,789	71.1	62.7	98.6	100.0	67.7	32.1
1935-----	70,080	43,872	26,154	55.1	45.8	83.2	100.0	62.6	37.3
1936-----	71,527	44,242	27,215	55.9	46.1	84.7	100.0	61.9	38.0
1937-----	69,324	42,184	27,088	53.8	43.9	82.5	100.0	60.9	39.1
1938-----	63,735	38,475	25,212	49.1	40.0	75.1	100.0	60.4	39.6
1939-----	61,609	35,959	25,600	47.1	37.2	74.6	100.0	58.4	41.6
1940-----	60,428	34,818	25,541	45.8	36.0	72.4	100.0	57.6	42.3
1941-----	59,251	33,887	25,318	44.5	34.9	70.5	100.0	57.2	42.7
1942-----	57,690	32,339	25,289	43.1	33.3	69.1	100.0	56.1	43.8
1943-----	57,005	30,922	26,019	42.6	32.0	69.9	100.0	54.2	45.6
1944-----	54,731	29,330	25,358	41.3	31.0	67.0	100.0	53.6	46.3
1945-----	52,916	27,928	24,942	40.1	29.9	64.6	100.0	52.8	47.1
1946-----	50,911	25,795	25,077	36.4	25.7	63.7	100.0	50.7	49.3
1947-----	48,064	23,041	24,994	33.5	22.3	62.2	100.0	47.9	52.0
1948-----	43,833	19,733	24,070	30.0	18.8	58.7	100.0	45.0	54.9
1949-----	39,100	17,411	21,657	26.3	16.3	51.7	100.0	44.5	55.4
1950 ² -----	33,959	14,170	19,770	22.5	13.1	46.1	100.0	41.7	58.2

¹ Total includes age not stated.

² Rates based on Apr. 1, 1950, enumerated population.

NOTE: The Death Registration States increased from 10 States and the District of Columbia in 1900 to the entire continental United States in 1933.

to note that the period of accelerated decline coincides with the period which witnessed the growth of combined Federal-State antituberculosis programs, intensified X-ray screening activities, and increased emphasis on tuberculosis control generally.

Trend by Age

In 1900, 3 out of every 4 tuberculosis deaths were among persons under 45 years of age. The mortality rate for this age group was 185.0 per 100,000 population, compared to a rate of 228.6

Table 3. Death rates for tuberculosis (all forms), by age, in continental United States, 1900 and 1950

Age (years)	Rate per 100,000 population			Age (years)	Rate per 100,000 population		
	1900 ¹	1950 ²	Percentage decline		1900 ¹	1950 ²	Percentage decline
All ages-----	194.4	22.5	88.4	25-34-----	294.3	19.1	93.5
Under 1-----	311.6	8.5	97.3	35-44-----	253.6	26.1	89.7
1-4-----	101.8	6.3	93.8	45-54-----	215.6	35.9	83.3
5-14-----	36.2	1.8	95.0	55-64-----	223.0	47.7	78.6
15-24-----	205.7	11.3	94.5	65-74-----	256.1	57.7	77.5
				75 and over-----	269.2	60.9	77.4

¹ Rates for the Death Registration States; 10 States and the District of Columbia.

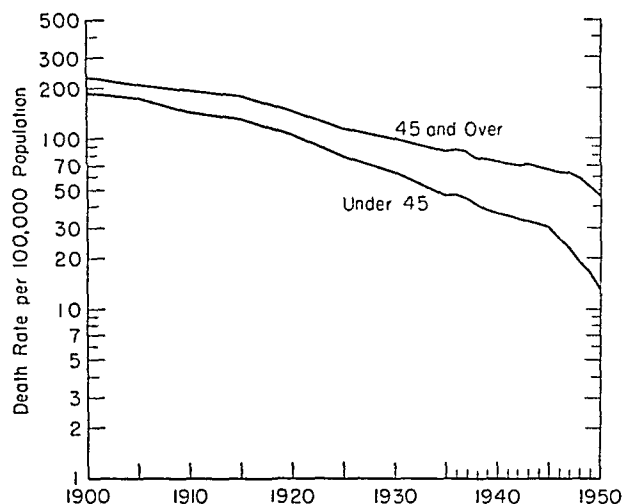
² Rates based on Apr. 1, 1950, enumerated population.

for age 45 and over. In 1950, only 42 percent of the deaths were among persons under 45 years of age. The death rate for the "under 45" age group was 13.1, compared to a rate of 46.1 for the "45 and over" age group.

The tuberculosis death rates for these two age groups at 5-year intervals from 1900 to 1935 and for each year from 1935 through 1950 are shown in figure 1 and table 2. Both groups showed a remarkable decline in tuberculosis mortality, but with a highly significant difference. The relative difference between the rates for the two groups has been growing at an ever-increasing pace. Tuberculosis mortality has declined more rapidly among younger persons than among older persons and probably will continue to do so.

A comparison of tuberculosis death rates for 10 age groups for 1900 and 1950, shown in table 3, provides evidence that the younger age groups have shown higher percentage declines than the older groups. In fact, with only one exception, each age group has shown a greater percentage decline than the next older age group.

Figure 1. Age trend in tuberculosis death rates, 1900-1950 (expanding Death Registration States).



Trend by Race and Sex

Since 1910, tuberculosis mortality has been reduced dramatically for each race-sex group (figure 2 and table 4). Declines in the death rate between 1910 and 1950 ranged from 84.2

Table 4. Death rates for tuberculosis (all forms), by race and sex, expanding Death Registration States: decennial years, 1910-40; annually, 1940-50

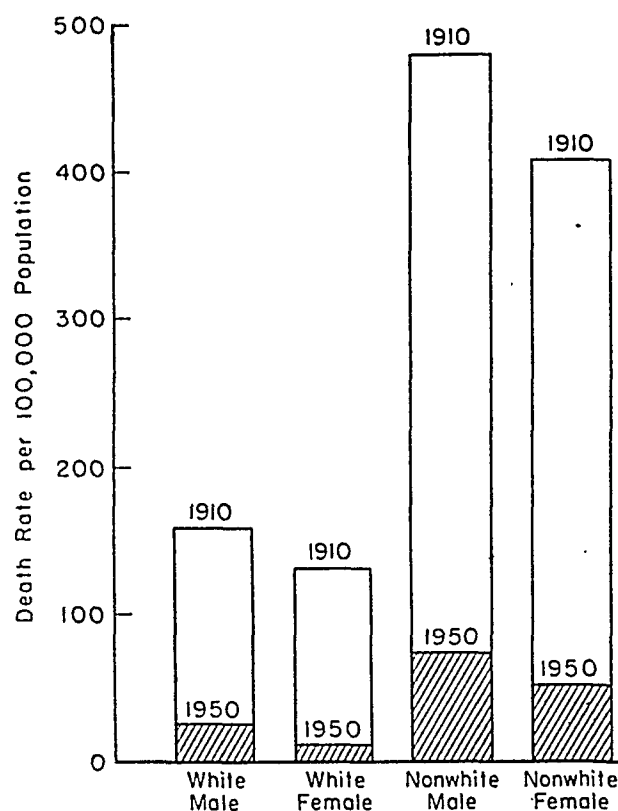
[Rates per 100,000 estimated midyear population in each specified group]

Calendar year	All races			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
1910.....	153.8	167.1	139.8	145.9	158.2	132.8	445.5	479.3	406.8
1920.....	113.1	116.6	109.5	99.5	104.1	94.8	262.4	255.4	269.6
1930.....	71.1	76.2	65.9	57.7	63.4	51.9	192.0	194.3	189.8
1940.....	45.8	54.1	37.5	36.5	44.7	28.2	127.6	138.7	116.9
1941.....	44.5	52.5	36.5	35.4	43.3	27.4	124.2	134.3	114.5
1942.....	43.1	52.3	34.0	34.4	43.3	25.6	118.4	131.4	106.0
1943.....	42.6	52.9	32.6	34.3	44.4	24.7	112.9	126.4	100.0
1944.....	41.3	53.1	30.5	33.7	45.0	23.3	106.2	122.7	91.3
1945.....	40.1	53.0	28.6	32.7	45.1	21.7	102.6	120.9	86.5
1946.....	36.4	46.2	26.9	29.8	39.2	20.6	92.3	106.2	79.2
1947.....	33.5	43.0	24.2	27.1	36.3	18.0	88.1	100.6	76.1
1948.....	30.0	39.4	20.8	24.3	33.3	15.4	78.4	92.1	65.4
1949.....	26.3	34.6	18.1	20.8	28.6	13.2	72.4	86.7	58.8
1950 ¹	22.5	30.1	15.1	17.9	25.0	10.8	62.3	74.7	50.6
Percentage decline 1910-50.....	85.4	82.0	89.2	87.7	84.2	91.9	86.0	84.4	87.6
Percentage decline 1910-40.....	70.2	67.6	73.2	75.0	71.7	78.8	71.4	71.1	71.3
Percentage decline 1940-50.....	50.9	44.4	59.7	51.0	44.1	61.7	51.2	46.1	56.7

¹ Rates based on Apr. 1, 1950, enumerated population.

NOTE: The Death Registration States increased from 20 States and the District of Columbia in 1910 to the entire continental United States in 1933.

Figure 2. Comparison of tuberculosis death rates for race-sex groups in 1910 (Death Registration States) with 1950 (continental United States).



percent for white males to 91.9 percent for white females. For each race, the rates for females dropped faster than for males. In recent years

this sex difference in the mortality decline has become increasingly pronounced.

The characteristic pattern exhibited by tuberculosis mortality for this period has been one of highest mortality in the nonwhite male group, followed in order by the nonwhite female, white male, and white female groups. This pattern has prevailed throughout the period with the exception of two intervals, 1916 and 1919-29, during which the mortality rate for nonwhite females was slightly higher than for nonwhite males.

Current Mortality

Tuberculosis deaths and death rates by age for 1949 through 1951, together with an average for these 3 years, are shown in table 5. As shown by these data, the lowest death rates occur in the younger age groups, and generally the tuberculosis mortality rates increase with age. The tuberculosis mortality level for each age group in 1951 was lower than for the corresponding age group in 1950 and in 1949.

Tuberculosis mortality by race and sex for 1949 through 1951 is presented in table 6. It may be seen here that the rate among males is about twice that among females, and that the rates for nonwhites are more than three times the rates for whites. All groups, however, had lower rates for 1950 than for 1949, and lower rates again for 1951 than for 1950.

Table 5. Mortality from tuberculosis (all forms), by age, in continental United States, 1949-51

Age (years)	Number of deaths				Rate per 100,000 population			
	3-year average	1949	1950	1951 ¹	3-year average ²	1949	1950 ²	1951 ¹
All ages.....	34, 184	39, 100	33, 959	29, 492	22. 7	26. 3	22. 5	19. 2
Under 1.....	246	279	268	190	7. 8	8. 5	8. 5	5. 6
1-14.....	1, 137	1, 302	1, 263	845	3. 0	3. 5	3. 4	2. 1
15-24.....	2, 487	3, 347	2, 497	1, 616	11. 3	15. 0	11. 3	7. 5
25-34.....	4, 750	5, 712	4, 542	3, 995	20. 0	24. 4	19. 1	16. 9
35-44.....	5, 715	6, 771	5, 600	4, 773	26. 6	32. 7	26. 1	22. 5
45-54.....	6, 308	7, 170	6, 227	5, 528	36. 4	41. 6	35. 9	31. 2
55-64.....	6, 388	7, 067	6, 342	5, 756	48. 0	52. 8	47. 7	41. 5
65-74.....	4, 809	5, 048	4, 855	4, 525	57. 1	65. 7	57. 7	55. 7
75-84.....	2, 044	2, 112	2, 071	1, 949	62. 4	67. 5	63. 2	58. 3
85 and over.....	254	260	275	226	44. 0	56. 4	47. 7	44. 1
Not stated.....	47	32	19	89				

¹ National Office of Vital Statistics: Annual summary, 1951, 10-percent sample of death certificates. Current Mortality Analysis, vol. 9, No. 13.

² Rates based on Apr. 1, 1950, enumerated population.

Table 6. Mortality from tuberculosis (all forms), by race and sex, in continental United States, 1949-51

Sex	Number of deaths				Rate per 100,000 population			
	3-year average	1949	1950	1951 ¹	3-year average ²	1949	1950 ²	1951 ¹
Total.....	34, 184	39, 100	33, 959	29, 492	22. 7	26. 3	22. 5	19. 2
Male.....	22, 665	25, 538	22, 539	19, 919	30. 3	34. 6	30. 1	26. 3
Female.....	11, 518	13, 562	11, 420	9, 573	15. 2	18. 1	15. 1	12. 3
White.....	24, 285	27, 718	24, 136	21, 000	18. 0	20. 8	17. 9	15. 3
Male.....	16, 803	18, 884	16, 787	14, 739	25. 0	28. 6	25. 0	21. 8
Female.....	7, 481	8, 834	7, 349	6, 261	11. 0	13. 2	10. 8	9. 0
Nonwhite.....	9, 899	11, 382	9, 823	8, 492	62. 8	72. 4	62. 3	51. 5
Male.....	5, 862	6, 654	5, 752	5, 180	76. 1	86. 7	74. 7	64. 6
Female.....	4, 037	4, 728	4, 071	3, 312	50. 1	58. 8	50. 6	39. 1

¹ National Office of Vital Statistics: Annual summary, 1951, 10-percent sample of death certificates. Current Mortality Analysis, vol. 9, No. 13. ² Rates based on Apr. 1, 1950, enumerated population.

NOTE: Average numbers of deaths are rounded without being adjusted to group totals.

Table 7. Number of deaths and death rates from tuberculosis (all forms), by age, race, and sex, in continental United States, 1950

Age (years)	Number of deaths								
	All races			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages.....	33, 959	22, 539	11, 420	24, 136	16, 787	7, 349	9, 823	5, 752	4, 071
Under 5.....	1, 091	561	530	678	329	349	413	232	181
5-9.....	221	115	106	126	61	65	95	54	41
10-14.....	219	83	136	115	55	60	104	28	76
15-19.....	790	302	488	300	117	183	490	185	305
20-24.....	1, 707	680	1, 027	765	296	469	942	384	558
25-29.....	2, 137	974	1, 163	1, 111	511	600	1, 026	463	563
30-34.....	2, 405	1, 192	1, 213	1, 374	673	701	1, 031	519	512
35-44.....	5, 600	3, 550	2, 050	3, 682	2, 416	1, 266	1, 918	1, 134	784
45-54.....	6, 227	4, 820	1, 407	4, 462	3, 561	901	1, 765	1, 259	506
55-64.....	6, 342	5, 111	1, 231	5, 164	4, 240	924	1, 178	871	307
65-74.....	4, 855	3, 643	1, 212	4, 213	3, 170	1, 043	642	473	169
75 and over.....	2, 346	1, 498	848	2, 136	1, 352	784	210	146	64
Not stated.....	19	10	9	10	6	4	9	4	5
All ages.....	Rate per 100,000 enumerated population								
	22. 5	30. 1	15. 1	17. 9	25. 0	10. 8	62. 3	74. 7	50. 6
Under 5.....	6. 7	6. 8	6. 7	4. 8	4. 5	5. 0	20. 9	23. 4	18. 3
5-9.....	1. 7	1. 7	1. 6	1. 1	1. 0	1. 1	5. 9	6. 8	5. 1
10-14.....	2. 0	1. 5	2. 5	1. 2	1. 1	1. 3	7. 3	3. 9	10. 7
15-19.....	7. 4	5. 7	9. 2	3. 2	2. 5	3. 9	38. 1	29. 6	46. 2
20-24.....	14. 9	12. 1	17. 5	7. 5	5. 9	9. 1	72. 3	63. 6	79. 8
25-29.....	17. 5	16. 3	18. 5	10. 2	9. 6	10. 8	77. 9	74. 4	81. 0
30-34.....	20. 9	21. 2	20. 6	13. 3	13. 2	13. 3	88. 8	95. 4	83. 0
35-44.....	26. 1	33. 5	18. 9	19. 1	25. 4	13. 0	87. 1	107. 1	68. 6
45-54.....	35. 9	55. 7	16. 2	28. 4	45. 4	11. 5	107. 8	153. 8	61. 8
55-64.....	47. 7	76. 7	18. 6	41. 8	68. 6	15. 0	124. 5	178. 6	66. 9
65-74.....	57. 7	89. 9	27. 8	54. 2	84. 8	25. 9	99. 1	149. 2	51. 1
75 and over.....	60. 9	85. 9	40. 2	59. 2	83. 3	39. 5	84. 6	122. 1	49. 8

A breakdown of tuberculosis mortality by age, race, and sex for 1950 is given in table 7. Important differences may be noted in the ages at which highest mortality occurs in each race-sex category. For white males, the death rates increase almost continuously with age, reaching a high point of about 85 per 100,000 population in the age group 65-74 years. The rate for white females, on the other hand, is fairly uniform from age 20 through age 64, and then rises to a peak at age 75 and over. After age 30, white males generally have higher mortality rates than white females; before age 30, the reverse is true.

Nonwhite males have a higher mortality rate than nonwhite females at ages beyond 30 years. At ages under 30, nonwhite females generally have the higher rates. The pattern for nonwhites is essentially the same as for whites.

The peak age of death is reached between ages 45 and 64 years for nonwhite males and between ages 20 and 34 years for nonwhite females. Both groups show minor peaks for ages under 5 years, then drop to their minimum rates, rise to their major peaks, and finally taper down at the older ages.

Table 8 shows tuberculosis deaths and death rates for 1950 by specified form of disease. The great bulk of the deaths, more than 90 percent, were due to respiratory tuberculosis. Of the 2,866 deaths from nonrespiratory tuberculosis, more than one-third were due to tuberculous meningitis and almost another third to disseminated tuberculosis.

Years of Life Lost

In studying mortality from any disease, it is often useful to obtain some measure which takes into account not only the actual number of deaths from the particular disease but also the age distribution of these deaths. Generally, the younger the age at death, the greater the loss to society. Thus, to fully appreciate the impact of mortality from a given disease, it is necessary to compute a measure which weights each death according to the age at death—the younger the age, the greater the weight assigned to it. This has been done for tuberculosis deaths for 1940 and 1950 (tables 9 and 10).

For 1940, the actual weights used were the

Table 8. Number of deaths and death rates from tuberculosis, by specified form, in continental United States, 1950

Cause of death	Number of deaths	Percent of total	Rate per 100,000 population ¹	Cause of death	Number of deaths	Percent of total	Rate per 100,000 population ¹
Tuberculosis, all forms-----	33, 959	100. 0	22. 5	Tuberculosis of meninges and central nervous system-----	1, 094	3. 2	0. 7
Tuberculosis of respiratory system-----	31, 093	91. 6	20. 6	Tuberculosis of intestines, peritoneum, and mesenteric glands-----	229	0. 7	0. 2
Respiratory tuberculosis with mention of occupational disease of lung-----	635	1. 9	0. 4	Tuberculosis of bones and joints, active or unspecified-----	242	0. 7	0. 2
Pulmonary tuberculosis-----	29, 228	86. 1	19. 4	Late effects of tuberculosis of bones and joints-----	6	(?)	(?)
Pleural tuberculosis-----	385	1. 1	0. 3	Tuberculosis of skin and subcutaneous cellular tissue-----	12	(?)	(?)
Primary tuberculosis complex with symptoms-----	8	(?)	(?)	Tuberculosis of lymphatic system-----	67	0. 2	(?)
Tracheobronchial glandular tuberculosis with symptoms-----	14	(?)	(?)	Tuberculosis of genitourinary system-----	274	0. 8	0. 2
Other respiratory tuberculosis-----	34	0. 1	(?)	Tuberculosis of adrenal glands-----	29	0. 1	(?)
Tuberculosis, unspecified site-----	789	2. 3	0. 5	Tuberculosis of other organs-----	38	0. 1	(?)
Tuberculosis, other forms-----	2, 866	8. 4	1. 9	Disseminated tuberculosis-----	875	2. 6	0. 6

¹ Rates based on Apr. 1, 1950, enumerated population.

² Less than 0.05.

Table 9. Years of life lost from tuberculosis deaths in continental United States, 1940

Age (years)	White male				White female			
	Tuberculosis eliminated		Number of tuberculosis deaths	Potential years lost	Tuberculosis eliminated		Number of tuberculosis deaths	Potential years lost
	1939-41 \bar{e}_x	Interpolated value			1939-41 \bar{e}_x	Interpolated value		
Under 1.....	63.54	64.64	163	10,536	67.90	68.73	153	10,516
1-2.....	65.73	65.39	151	9,874	69.56	69.21	158	10,935
2-3.....	65.04	64.63	79	5,106	68.85	68.42	70	4,789
3-4.....	64.21	63.77	61	3,890	67.99	67.55	50	3,378
4-5.....	63.33	62.88	48	3,018	67.10	66.64	42	2,799
5-9.....	62.42	60.09	140	8,413	66.18	63.82	129	8,233
10-14.....	57.76	55.41	152	8,422	61.45	59.06	200	11,812
15-19.....	53.06	50.77	552	28,025	56.66	54.30	1,022	55,495
20-24.....	48.47	46.21	1,260	58,225	51.93	49.58	1,932	95,789
25-29.....	43.94	41.67	1,746	72,756	47.23	44.91	2,069	92,919
30-34.....	39.40	37.15	2,056	76,380	42.58	40.28	1,773	71,416
35-39.....	34.89	32.69	2,222	72,637	37.98	35.73	1,511	53,988
40-44.....	30.48	28.36	2,661	75,466	33.47	31.28	1,222	38,224
45-49.....	26.24	24.25	2,962	71,829	29.08	26.98	1,031	27,816
50-54.....	22.25	20.40	3,133	63,913	24.87	22.86	954	21,808
55-59.....	18.55	16.88	2,846	48,040	20.85	18.97	893	16,940
60-64.....	15.20	13.69	2,328	31,870	17.09	15.37	862	13,249
65-69.....	12.17	10.83	1,768	19,147	13.64	12.10	881	10,660
70-74.....	9.48	8.34	1,220	10,175	10.55	9.26	761	7,047
75-79.....	7.20	6.30	655	4,127	7.96	6.93	519	3,597
80-84.....	5.40	4.72	272	1,284	5.90	5.13	263	1,349
85 and over.....	4.03	13.06	96	294	4.35	13.24	108	350
Not stated.....			27				10	
Total.....			26,598	683,427			16,613	563,109
	Nonwhite male				Nonwhite female			
	Tuberculosis eliminated		Number of tuberculosis deaths	Potential years lost	Tuberculosis eliminated		Number of tuberculosis deaths	Potential years lost
	1939-41 \bar{e}_x	Interpolated value			1939-41 \bar{e}_x	Interpolated value		
Under 1.....	54.44	56.38	92	5,187	57.60	59.13	88	5,203
1-2.....	58.31	58.08	97	5,634	60.66	60.14	74	4,470
2-3.....	57.85	57.47	45	2,586	60.15	59.76	53	3,167
3-4.....	57.09	56.67	39	2,210	59.37	58.94	32	1,886
4-5.....	56.24	55.80	25	1,395	58.51	58.07	23	1,336
5-9.....	55.35	53.04	107	5,675	57.63	55.30	93	5,143
10-14.....	50.73	48.42	148	7,166	52.96	50.62	275	13,921
15-19.....	46.11	43.92	663	29,119	48.27	46.07	1,138	52,428
20-24.....	41.72	39.67	1,100	43,637	43.86	41.74	1,460	60,940
25-29.....	37.61	35.63	1,125	40,084	39.61	37.54	1,303	48,915
30-34.....	33.64	31.72	999	31,688	35.47	33.50	947	31,725
35-39.....	29.79	27.96	956	26,730	31.52	29.67	759	22,520
40-44.....	26.12	24.41	1,014	24,752	27.82	26.10	541	14,120
45-49.....	22.69	21.18	850	18,003	24.38	22.85	379	8,660
50-54.....	19.67	18.34	670	12,288	21.32	19.99	301	6,017
55-59.....	17.01	15.82	462	7,309	18.65	17.47	208	3,634
60-64.....	14.62	13.48	316	4,260	16.29	15.17	135	2,048
65-69.....	12.34	11.25	230	2,588	14.05	12.97	96	1,245
70-74.....	10.16	9.16	147	1,347	11.88	10.87	51	554
75-79.....	8.16	7.33	58	425	9.85	8.94	24	215
80-84.....	6.50	5.80	24	139	8.03	7.22	9	65
85 and over.....	5.10	13.73	14	52	6.40	14.92	15	74
Not stated.....			16				16	
Total.....			9,197	272,274			8,020	288,286

¹ Value given for \bar{e}_x at age 90 is used.

life expectancy values taken from a life table from which tuberculosis as a cause of death had been eliminated. The number of deaths for each age group was multiplied by the life expectancy for the particular age group. (The life expectancy was taken at the midpoint of the age interval, since it is assumed that all

deaths in a given age group occur at the midpoint.) The product is the number of years of life that the age group could expect to live if tuberculosis had been eliminated as a cause of death. The sum of the products indicates the total potential years of life lost for the entire group.

Table 10. Years of life lost from tuberculosis deaths in continental United States, 1950

Age (years)	White male				White female			
	1950 e _x	Inter- polated value	Number of deaths	Potential years lost	1950 e _x	Inter- polated value	Number of deaths	Potential years lost
Under 1.....	66.6	67.1	72	4,831	72.4	72.8	77	5,606
1-4.....	67.6	65.8	257	16,911	73.1	71.3	272	19,394
5-9.....	64.0	61.6	61	3,758	69.5	67.1	65	4,362
10-14.....	59.2	56.8	55	3,124	64.6	62.2	60	3,732
15-19.....	54.4	52.1	117	6,096	59.7	57.3	183	10,486
20-24.....	49.7	47.5	296	14,060	54.9	52.5	469	24,623
25-29.....	45.2	42.9	511	21,922	50.1	47.8	600	28,680
30-34.....	40.5	38.2	673	25,709	45.4	43.0	701	30,143
35-39.....	35.9	33.7	1,030	34,711	40.6	38.3	694	26,580
40-44.....	31.4	29.3	1,386	40,610	36.0	33.8	572	19,334
45-49.....	27.1	25.1	1,578	39,608	31.5	29.3	493	14,445
50-54.....	23.0	21.2	1,983	42,040	27.1	25.0	408	10,200
55-59.....	19.3	17.6	2,145	37,752	22.9	21.0	445	9,345
60-64.....	15.9	14.5	2,095	30,378	19.0	17.2	479	8,239
65-69.....	13.0	11.7	1,888	22,090	15.3	13.7	529	7,247
70-74.....	10.3	9.2	1,282	11,794	12.0	10.6	514	5,448
75-79.....	8.0	7.1	821	5,829	9.2	8.1	433	3,507
80-84.....	6.1	5.3	384	2,035	6.9	6.0	251	1,506
85 and over.....	4.5	¹ 4.5	147	662	5.1	¹ 5.1	100	510
Not stated.....			6				4	
Total.....			16,787	363,920			7,349	233,387
Age (years)	Nonwhite male				Nonwhite female			
	1950 e _x	Inter- polated value	Number of deaths	Potential years lost	1950 e _x	Inter- polated value	Number of deaths	Potential years lost
Under 1.....	59.2	60.3	65	3,920	63.2	64.0	54	3,456
1-4.....	61.3	59.7	167	9,970	64.8	63.1	127	8,014
5-9.....	58.0	55.6	54	3,002	61.4	59.1	41	2,423
10-14.....	53.2	50.9	28	1,425	56.7	54.3	76	4,127
15-19.....	48.5	46.3	185	8,566	51.9	49.6	305	15,128
20-24.....	44.0	41.9	384	16,090	47.3	45.1	558	25,166
25-29.....	39.7	37.6	463	17,409	42.9	40.7	563	22,914
30-34.....	35.5	33.5	519	17,387	38.5	36.5	512	18,688
35-39.....	31.5	29.5	533	15,724	34.4	32.4	441	14,288
40-44.....	27.5	25.7	601	15,446	30.4	28.5	343	9,776
45-49.....	23.8	22.2	632	14,030	26.6	24.9	262	6,524
50-54.....	20.5	19.1	627	11,976	23.2	21.7	244	5,295
55-59.....	17.6	16.4	518	8,495	20.2	19.0	163	3,097
60-64.....	15.2	14.3	353	5,048	17.7	16.7	144	2,403
65-69.....	13.3	12.2	297	3,623	15.6	14.3	109	1,559
70-74.....	11.1	10.2	176	1,795	13.0	12.0	60	720
75-79.....	9.3	8.7	99	861	11.0	10.3	37	381
80-84.....	8.0	7.0	32	224	9.5	8.5	14	119
85 and over.....	6.0	¹ 6.0	15	90	7.4	¹ 7.4	13	96
Not stated.....			4				5	
Total.....			5,752	155,081			4,071	144,176

¹ Value given for e_x at age 85 is used.

Table 11. Tuberculosis deaths and potential years of life lost from tuberculosis deaths, by race and sex, in continental United States, 1940 and 1950

	Tuberculosis deaths				Potential years of life lost (in thousands)			
	1950	1940	Numerical decline	Percentage decline	1950	1940	Numerical decline	Percentage decline
Total.....	33, 959	60, 428	26, 469	43. 8	896	1, 806	910	50. 4
White male.....	16, 787	26, 598	9, 811	36. 9	364	683	319	46. 7
White female.....	7, 349	16, 613	9, 264	55. 8	233	563	330	58. 6
Nonwhite male.....	5, 752	9, 197	3, 445	37. 5	155	272	117	43. 0
Nonwhite female.....	4, 071	8, 020	3, 949	49. 2	144	288	144	50. 0

For 1950, years of life lost were computed similarly. No life table with tuberculosis eliminated was available for 1950, however. Hence, the potential years of life lost for the 1950 tuberculosis deaths are slightly understated.

As shown in table 11, somewhat less than a million years of life were lost by tuberculosis deaths in 1950. This represents a decline of 910,000 years, or 50.4 percent, from the staggering 1,806,000 years lost as the result of the 1940 tuberculosis deaths. All race-sex groups shared in the general decline, each group showing a substantial reduction during this period.

A comparison of the percentage decline in deaths with the percentage decline in years of life lost shows that each race-sex group had a greater decline in the latter. This is a result of the increasing age at death from tuberculosis,

a fact which should be cited as one of the notable achievements in tuberculosis control.

Conclusion

It has been shown in this paper that tuberculosis mortality in the United States is now the lowest in history and that the greatest gains have been achieved in recent years. Moreover, the outlook for the future is encouraging. Tuberculosis, however, ranked seventh as a cause of death in 1950, and was the leading killer from disease for the 15-34 age group. The toll from tuberculosis mortality in terms of potential years of life lost amounted to about 900,000 years in 1950. It is evident from these figures alone that tuberculosis still remains a major killer and still retains its importance as a leading public health problem.

Consolidation of Public Health Service Regional Offices

The Public Health Service offices for Region I (Connecticut, Maine, Massachusetts, Vermont, New Hampshire, Rhode Island) have been consolidated with those for Region II (New York, New Jersey, Delaware, Pennsylvania). Headquarters are at New York City. Dr. Henry A. Holle is regional medical director.

Region IV offices (Kentucky, Michigan, Ohio) have been consolidated with those for Region V (Illinois, Indiana, Wisconsin, Minnesota). Headquarters are at Chicago. Dr. Harald M. Graning is regional director.

Dr. Richard F. Boyd, formerly at Boston, is now regional medical director for Region X, San Francisco. Also transferred to Region X was Dr. Welby W. Bigelow, who had been acting director for Region IV at Cleveland.

technical publications

Reported Incidence of Selected Notifiable Diseases: United States, Each Division and State, 1920-50.

Vital Statistics Special Reports. National Summaries, vol. 37, No. 9, June 15, 1953. 64 pages; tables. Available from the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

Because of the large number of requests for time series data on notifiable diseases for the country as a whole or for individual States, the National Office of Vital Statistics has issued this special summary report giving the reported incidence of selected notifiable diseases for the United States, each division and State, for the years 1920 through 1950.

A total of 31 diseases of national interest is included in the listing.

Since figures were available from comparatively few States prior to 1920, this date was selected arbitrarily as the starting point for the reports of most diseases. A few series are for shorter periods.

The tabulations show not only trends in incidence of disease, but also the changing patterns in classifying and reporting over the years.

The diseases included in the tabulations are: amebiasis, anthrax, bacillary dysentery, botulism, brucellosis, dengue, diphtheria, infectious hepatitis, acute infectious encephalitis, leprosy, leptospirosis, malaria, meningococcal infections, psittacosis and ornithosis, acute poliomyelitis, Q fever, measles, tetanus, rabies in man and in animals, Rocky Mountain spotted fever, scarlet fever and streptococcal sore throat, smallpox, trachoma, trichiniasis, tularemia, tuberculosis, typhoid and paratyphoid fever, endemic typhus, whooping cough, and plague.

— for the general public —

Coronary Artery Disease

Health Information Series No. 68, Public Health Service Publication No. 145. Revised 1953. 5 cents; \$2.25 per 100.

One of a series of four health information leaflets on the diseases of the heart (see *Public Health Reports*, vol. 67, No. 9, p. 928), this recently revised publication is concerned with one of the most common forms of heart disease.

The introductory paragraphs, describing the coronary artery system, are followed by answers to the questions of what is coronary artery disease; what can be done for coronary artery disease; how long can the person with coronary artery disease live; who gets coronary artery disease; and what is now being done to prevent coronary artery disease.

The frequently used terms angina pectoris, coronary thrombosis, and

collateral circulation are explained, and the various types of medicine used in the relief of this heart condition, and current research on its cause, are discussed. The reader is advised that under the supervision of a physician, the victim of coronary artery disease has a good chance for a useful life of many years.

Typhoid Fever

Health Information Series, No. 72. Public Health Service Publication No. 282. 1953. 1-fold leaflet. 5 cents; \$1.75 per 100.

Although typhoid fever causes relatively few cases of illness or death in the United States, it remains a public health problem in other parts of the world. This health information leaflet describes the disease, its symptoms, how it is transmitted, and present methods of treatment.

Several paragraphs are devoted to the typhoid carrier and the health problems peculiar to this condition. Preventive measures are stressed: vaccination to protect the individual and good public health and home health practices to protect the community. Suggestions are given for travelers, and readers are advised to consult their health officer or physician for further information.

Rheumatic Heart Disease

Health Information Series No. 67, Public Health Service Publication No. 144. 1953. 2-fold leaflet. 5 cents; \$2.25 per 100 copies.

The council on rheumatic fever and congenital heart disease of the American Heart Association released, in January, a statement on the prevention of recurrent attacks of rheumatic fever through the prolonged use of sulfonamide or penicillin. (See *Public Health Reports*, January 1953.)

Because of the importance of this prophylactic measure in the control of rheumatic fever and rheumatic heart disease, this health information leaflet has been revised accordingly. In addition to the general information on the nature of rheumatic heart disease and rheumatic fever, diagnosis and treatment, contained in the first edition, the leaflet now includes a paragraph on the advisability of giving children who have had rheumatic fever sulfonamide or penicillin daily, under doctor's directions, for at least 5 years.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Tuberculosis: A Time for Decision

By THOMAS PARRAN, M.D., Dr.P.H.

AS THE HENRY PHIPPS INSTITUTE celebrates its first half century of achievement, it is useful to undertake an appraisal of where we stand today in the battle against tuberculosis, and to attempt to draft the strategy for finishing the job. I realize the futility of hoping to contribute original ideas at this time for decision. All I presume to offer is a candid camera shot of the forest in which the tuberculosis experts have been doing excellent work among the trees.

That you may forbear as I attempt this, I quote Laennec, who wrote to his cousin: "Do not fear to repeat what has already been said. Men need these things dinned into their ears many times and from all sides. The first version makes them pick up their ears, the second registers, and the third enters" (1).

Dr. Parran, dean of the Graduate School of Public Health of the University of Pittsburgh, was Surgeon General of the Public Health Service from 1936 to 1948. In an article entitled, "No Defense For Any of Us," which appeared in the April 1938 issue of Survey Graphic, he suggested methods which could be followed in setting up a program for national control of tuberculosis, since many of the techniques used in the program for the control of venereal diseases, which already had been started, could be applied to tuberculosis control. During the early part of World War II, he supported the Public Health Service's experimental work on the use of small films in X-ray examinations. This work led to trials of the films on a demonstration basis. Soon afterward, in 1944, the national tuberculosis control program was authorized and began operation.

Early Approaches

Prior to 1900, public health measures were largely punitive. Quarantine, it was assumed, would erect safe barriers to the spread of epidemic disease. Later, specific immunization, long effective in the control of smallpox, was believed to be the method of fulfilling Pasteur's prophecy that "infectious disease would be banished from the earth."

Concurrently, the sanitary engineer played a major role in improving the human environment by the purification of public water supplies, the pasteurization of milk and other dairy products, and the draining or neutralizing of mosquito breeding grounds. He also initiated more sanitary methods in the handling of food, while the chemists taught processors how to preserve it safely. Refrigeration made possible a diet including fruits and green vegetables at all seasons. Nutritionists began nailing down some scientific facts as to what constitutes a good diet—they have no more finished their task than have the chemotherapists—and dietitians by the thousands emerged in a new profession to demonstrate these facts in many situations ranging from the factory lunchroom to the high school class of future housewives.

The Phipps Institute was born at one of the most exciting periods in the whole history of public health and preventive medicine. American living standards were being sharply raised and health standards along with them. There is no doubt that each set of conditions interacted upon the others and that hundreds of thousands of persons susceptible to tuberculosis yet not acquiring the disease were the beneficiaries.

Those who have devoted their lives to the control of tuberculosis have had valid cause for pride as they have watched the great downward curve of mortality from this disease. When the Phipps Institute was established 50 years ago, the "Captain of the Men of Death" was killing Americans in the most productive period of their lives at a rate more than 10 times greater than today. Today the world is convinced that tuberculosis is conquerable—convinced by demonstration rather than exhortation. Great minds, great hearts, great leadership, and great moneys have been rallied to this cause. Now, in 1953, the target has become measurable. The goal of eradication in this country and in our time is now attainable—at least to the optimist. And nobody but an optimist has any business in public health at all, in any of its branches.

Contributions by Nonmedical Men

The golden anniversary of the Phipps Institute represents, to my mind, an important factor in the progress of public health, but one often forgotten when the laurel wreaths are distributed and the accolades bestowed. It illustrates the great part played by laymen of vision, generosity, and courage who have contributed as greatly to the control of tuberculosis as has the brilliant work of scientists.

Many of the names are forgotten. One needs to dig below the surface in the history of this Institute, for example, to learn that when Henry Phipps in 1901 sought advice as to useful channels for his charitable endeavors, his close friend Samuel P. Harbison, of Pittsburgh, referred him to Francis J. Torrance, then a member and later president of the Pennsylvania State Commission of Public Charities. And in due course the Phipps Institute was born into the world of scientific aspiration. No matter how substantial its support in later years and in years to come from other grants and benefactions, we must never forget that its origin was due to the advice and encouragement of practical businessmen who had the vision to look beyond the obvious and the immediate.

Administrative leadership is also indispensable. I know of no single person who contributed more to tuberculosis control, for ex-

ample, than Homer Folks, for many years secretary of the State Charities Aid Association of New York. His great gift of leadership, his capacity for organization, and his eloquent persuasiveness, along with his incorruptibility and fine intelligence, would have made him a success in any business or profession. He chose to devote his talents to the public welfare in general and to tuberculosis control in particular, for the benefit of the people of the State of New York. With Dr. Hermann Biggs, New York's first great health commissioner, to steer a steady scientific course and with Homer Folks

50 Years of Tuberculosis "Study, Treatment, and Prevention"

The past half century has been a dynamic period in the attack on tuberculosis—a time of high hopes sometimes realized, sometimes dashed, but withal a time of steady progress in the development of the basic and applied knowledge essential to the eventual conquest of the disease.

Spanning this period and contributing importantly to the record of achievement is the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis. It was founded in 1903 by the Pittsburgh industrialist Henry Phipps, whose interest in tuberculosis was stimulated by Dr. Lawrence F. Flick of Philadelphia, one of the founders of the National Tuberculosis Association. In 1909 the Institute became a part of the University of Pennsylvania.

In February of 1953 the Institute celebrated its golden jubilee, asking leaders in the "study, treatment, and prevention of tuberculosis" to share their appraisal of our present status and future prospects.

The authors and Dr. Esmond R. Long, director of the Henry Phipps Institute and director of medical research of the National Tuberculosis Association, have made these papers available to Public Health Reports in advance of their appearance in a commemorative volume. The major portion of Dr. Parzan's discussion of the prevention of tuberculosis appears here, followed by a condensation of Dr. J. Burns Amberson's remarks on treatment.

—The Editors

to educate the people and their legislative representatives, the Empire State got off to a head start in public health and in tuberculosis control.

As other examples of nonmedical statesmen in public health, let me cite Frederick T. Gates and Wickliffe Rose, who guided the Rockefeller philanthropies which promoted medical education, added so much to our knowledge of preventable disease, and demonstrated so early the practicability of applying that knowledge to human need throughout the world. These are but a few among the many lay workers who have made possible the near victory in tuberculosis control and the almost complete victory against other and more vulnerable ancient plagues. Whatever our plans for the next half century, if they are to be successful, they must depend even more than in the past on citizens such as these.

Motivated in part by what Newsholm calls "the sentiment against suffering" and in part by the instinctive wisdom inherent in groups of good citizens who care profoundly and who will work devotedly for a cause outside and beyond their personal advancement, these men set forth zealously with the twin weapons of faith and hope. They had faith in our form of government, which will back with tax support measures for the welfare of the people after their authenticity has been demonstrated by voluntary pioneering. They had faith in the capacity of the average citizen to learn—to change his personal habits, if need be, in his own interest and that of his fellow citizen. They had hope that bed rest, fresh air, sunshine, and good food would help the victims of tuberculosis; that less crowding in filthy slums would lessen the spread of infection; that bovine tuberculosis could be eliminated.

Sociologists tell us how well-nigh impossible it is that people might change their habits without any specific promise that whatever they might do or might not do would save them from tuberculosis. Nevertheless, the people were motivated to action; a vast number were persuaded to do certain things and to refrain from doing others. All this, to my mind, entirely justifies the statement in the recent report of the President's Commission on the Health Needs of the Nation, "The individual effort of an in-

formed person will do more for his health and that of his family than all the things which can be done for them." You will note particularly the adjective "informed."

Current Status

Because the gains in the fight against tuberculosis have been substantial, we can accept rather cheerfully the fact that Pasteur was altogether too optimistic in his opinion that infectious disease could be banished from the earth and that Allen Krause in forecasting that the trend of tuberculosis rate would bring it to zero in 1935 was quite wrong (2). Tuberculosis we still have with us, but it is in manageable dimensions, at least as far as the Western World is concerned. Many persons now forecast that tuberculosis may become a minor cause of death in Western Europe, in North America, and in Australia before we know the reasons for this event. That would be good for humanity but a black eye for science.

By any scale of values, however, the 90-percent reduction in mortality rates in this country from 194 per 100,000 population in 1900 to less than 20 in 1951 is an outstanding performance. But there must be no complacency in our view of the tuberculosis that remains among us. It is not the time for a change in the energy and relentlessness with which the disease has been attacked. National averages are misleading. Tuberculosis mortality now is $3\frac{1}{2}$ times as high in the nonwhite population as among white citizens. Iowa and Minnesota may have rates of less than 10 per 100,000, but Alaska and Puerto Rico have rates 6 to 10 times the national average.

Even though statisticians believe that 1952 figures will show it to be ninth among the causes of mortality, and although it now accounts for only 2 percent of deaths in the country as a whole, tuberculosis is still a leading cause of death among young adults. In monetary terms, national efforts to control this disease are costing the American people more than \$350 million a year—a figure which does not take into account the cost and depreciation of hospital buildings or the training of professional personnel (3). If we try to estimate the loss in family incomes when the wage earner is separated from

his family for sanatorium care over long periods, and the fact that even though his life may be saved and his disease arrested he dares not go back to hard physical labor, the cost totals become astronomical. If one attempts to estimate the cost to the community of the broken homes so often resulting from tuberculosis either of father or mother, we would unhappily agree that tuberculosis still stands close to the top as a social tragedy, possibly exceeded only by mental disease.

Factors Affecting the Decline

Let us now consider briefly some of the reasons for the winning tide of battle thus far. We are faced at once with the paradoxical situation that not even the greatest living experts will make more than a cautious and qualified guess as to which of many relevant factors have had the greatest impact or what relative therapeutic or preventive weight may be given to any of them. A single exception to this generality is the epidemiological platitude that wherever the chain of infection is broken—whenever an early case of tuberculosis is taken out of the family, social, or business environment—x number of new cases do not develop. This single, simple fact may well be the keystone of the arch for the building of future programs.

Most experts are agreed that medical science alone cannot take major credit for the decline in tuberculosis rates, since the decline began long before control programs were initiated and before there were any scientific bases for such programs. For example, it has been estimated that the mortality rate in 1830 for the combined populations of Boston, New York, and Philadelphia was approximately 400 per 100,000 population; by 1900, this rate had dropped to approximately 250 in these three cities and to 204 in the United States as a whole.

As far back as 1937, when the mortality rate was far higher than today, Wade Hampton Frost, formerly of the Public Health Service and then of the Johns Hopkins University School of Hygiene and Public Health, expressed his belief that in this country we already had reached the stage at which the biological balance

is against the survival of the tubercle bacillus. He felt that even though measures taken up to that date to limit the spread of the bacillus in our environment were insufficient to prevent the infection of the great majority, such measures might still have great effect.

Another consideration, Frost thought, is the fact of "conditions limiting the propagation of the tubercle bacillus, which are: (a) that in order to escape from its host it must cause a lesion which breaks through the surface—in general, an extensive lesion which severely damages the host—and (b) that it succeeds in producing such a lesion in only a limited number of infected persons."

Various other pathogens of man are subject to one or another of these conditions, but none to both. The combination of these two limiting conditions constitutes the peculiarity of the tubercle bacillus which makes it more amenable to control by case isolation than are such diseases as diphtheria, scarlet fever, or measles. Consequently, Frost concluded: "Although tubercle bacilli multiply within the body, in a great many cases they do not escape to reach other hosts. Logically, therefore, for the eventual eradication of tuberculosis it is not necessary to set ourselves the impossible goal of immediate and complete prevention of all transmission. It is necessary that the rate of transmission be held permanently below the level at which a given number of infection-spreading cases succeed in maintaining themselves" (4).

This epidemiological prognosis should spur us to find more hidden cases and isolate them more swiftly from their susceptible associates. It encourages us also, in 1953, to believe that the biological balance is increasingly on our side.

Elements of Uncertainty

Nor should we disregard the elements of uncertainty which Frost pointed out, "among them, uncertainty as to the stability of our civilization." In the atomic age that has been thrust upon us since his death, we are all grimly aware that tuberculosis control, along with every other good thing our western civilization has evolved for and through its citizens, may be discarded in the event of another global war.

But assuming that our civilization stands, and assuming a continuation and improvement of environmental control, Frost saw only two forces which singly or together might check or reverse the downward trend. They were (a) a decrease in human resistance to the disease and (b) some fundamental change in the virulence of the tubercle bacillus, the specific properties of which, as he pointed out, have changed little in modern times.

As to the first of these possibilities, it might be noted that an increase in racial resistance over the centuries may be of some importance in "tuberculized" civilizations, but it does not explain the recent precipitous fall. Conversely, the low racial resistance among populations rarely exposed to infection is acknowledged. But since we assume that in the future these populations will not have similar gross repeated exposures, this fact is not of importance.

Developments Since 1937

It has been said that the level of tuberculosis mortality is a sensitive index of a complex variety of environmental factors. Since Frost made his carefully calculated predictions in 1937, a number of things have occurred in this country to affect that index. It is not possible to list these things in order of importance for, in fact, we do not as yet know with any degree of accuracy what has contributed most to the decline in the tuberculosis rate. Nevertheless, it is reasonable to assume, on the basis of experience, that each in some degree has weighted the scales more heavily against the tubercle bacillus.

1. Living standards, including standards of nutrition, have steadily improved; levels of education have risen; hours of work have lessened; general public health measures have been broadened and intensified.

2. As a result of increasingly intensive case finding, the number of newly discovered cases reached a peak of 137,006 in 1948; since then there has been a slight decline, year by year, to 118,491 new cases in 1951. Mass radiography of whole populations has become economically feasible and is being utilized for the benefit of about 14 million American citizens each year.

3. Chemotherapeutic agents have proved

helpful and may point the way toward a specific. Surgical procedures have been improved and are more widely used in appropriate cases to lessen the spread of infection and to prolong life.

4. The National Tuberculosis Act of 1944 charted a Federal policy and program for control of the disease, with States and research agencies cooperating, and authorized support for more extensive and more unified efforts.

5. A worldwide attack upon tuberculosis has been organized; the value of the BCG vaccination has been confirmed—though it is far from a complete answer for the prevention of tuberculosis—and it is being used on a broad scale internationally, especially in the war-torn and underdeveloped countries.

Quo Vadis?

At this point it is relevant to inquire, *quo vadis?* I agree with Dubos that progress does not necessarily consist of doing more and more of what has proved profitable in the past. Research is certainly needed. Even though the results may prove only that we are on the right track, research is needed to validate our going forward faster in the familiar channels.

But we cannot mark time waiting for the result of inquiries. In my opinion, these are some of the things we must go on doing at a brisk tempo, concurrently with a diversity of research:

1. Hospital beds more wisely utilized for the patients with active disease are the crux of the problem. Some waiting lists for such beds now are so long that the discovery of new cases in the absence of the means of relieving them perhaps adds to the sense of frustration.

2. More and better trained personnel are of equal importance with the provision of hospital beds. In some sanatoriums whole wings are closed for lack of professional staff. We need to recruit actively nurses, doctors, and technical personnel of all descriptions. We need to recruit an increasingly better type of student, and to make sure these are offered as good a professional opportunity in the care of the tuberculous patient as in any other area of medicine and public health.

3. Even though the disease may be eradicated

without better vaccines and drugs—merely by integrating biological wisdom with social technology in the management of everyday life—the search for the vaccine or for the drug might, in the long run, be simpler. A better vaccine or the new cure may be found. BCG and some new chemicals may be short steps in the right direction, or an entirely new direction may be indicated. Whatever the answer, the search must go on.

Exploration Needed

So far, I have been urging that we do more and that we do better some of the things already being done. Nevertheless, there are several areas in which we know very little about the potentialities for tuberculosis control and where exploration appears to be clearly called for.

For example, every student of tuberculosis is aware of the varying emphasis on diets over the years. Yet what, precisely, do we know about what types of food deficiency are or may be critical in their impact upon the patient? I am convinced only that during both world wars the lack of food was correlated with increased mortality from tuberculosis and that relief from a starvation diet was followed by a prompt reduction in mortality.

We have made general assumptions as to the relationship between “poor living conditions” and tuberculosis. Actually, we know nothing about it on the basis of scientific study.

We believe that exhausting physical work adversely affects resistance, but how we do not know. Does this factor or the working environment, or do both factors, account for the relatively higher death rate among older males? Springett maintains that despite the present form of the tuberculosis mortality curve, there has never yet been a group of men who experienced a greater mortality at ages over 45 years than their contemporaries experienced at young adult ages (5). Frost and others earlier reached the same conclusion, as the age “cohorts” of mortality were analyzed. From this evidence, can we conclude that tuberculosis deaths in later life are usually, though not always, the result of disease acquired many years earlier? In fact, it appears that the lifetime experience of any generation can be pre-

dicted from its level of mortality in the first years of life. Available evidence regarding exogenous and endogenous infections conflicts.

Even though it is not possible to change the totality of what we consider an adverse environment—in other words, we are not yet able to abolish poverty—may it not be found by careful investigation that some one factor predominates? Having found it, might it not be possible to ameliorate that one factor?

Research of this type is difficult and costly. It involves the skills of the social scientists integrated with the skills of public health and clinical scientists. The Graduate School of Public Health of the University of Pittsburgh is particularly interested in this type of study and is undertaking it in reference to certain other chronic diseases.

The Phipps Institute has pioneered in the fields of immunity and susceptibility in tuberculosis, and its experts would be the first to insist that the surface has hardly been scratched. Such work should continue, even if by some happy accident the perfect vaccine were to be discovered tomorrow, because of its contribution to our understanding of other disease processes.

We know little about the ways in which emotional stress affects resistance. That it does seems possible from the drop of the mortality curve in Japan, Germany, and Austria after the war had ended but before there were available good food, decent housing, or other factors, which in the United States we have considered basic for tuberculosis control.

Is the well-known tendency of tuberculosis to reactivate related to tension or emotional stress? Is this a factor among the infectious patients who leave the sanatorium against advice? Since 25 percent of our tuberculous veterans and an even larger percentage of civilian patients fall into this latter category, it would seem that we need scientists specializing in human behavior to integrate their skills with those of the tuberculosis epidemiologists and clinicians.

Expansion of Present Activities

Sanatorium care is the largest single debit entry in the United States control program. In

a recent review, Dr. Long very wisely suggests making more beds available for more patients by greater cooperation with the practicing physician, especially for those patients who have responded so well to hospital care and indoctrination that they may be sent home under proper medical supervision and chemotherapy (3).

This is sound in principle for several reasons: It should reduce the total cost of care, return the patient earlier to his family, and increase the interest and participation of more physicians in tuberculosis control. This last point is important, since private physicians now report only 15 percent of the new cases. Moreover, this suggestion is strengthened by the precedent of syphilis. A decade ago its treatment was practically a health department monopoly; today the private physician has taken over a very large proportion of it.

In addition to the mass X-rays, which serve as a dragnet gathering in many unsuspected cases, hospitals and clinics should be required to make a chest X-ray routinely upon every person entering for any disease condition. In view of the fact that the care of each tuberculosis patient costs, on the average, about \$15,000, every institution of diagnosis or healing should utilize every opportunity to identify another link in the chain of infection.

From my own experience in dealing with syphilis and other communicable diseases, I would suggest a much greater use of the epidemiological method. This is particularly practical in this country during the present period of transition, when a large part of the population is not exposed to tuberculosis until adult life and many not even then.

In 1900, by contrast, our environment was literally saturated with the tubercle bacillus, like fog in a valley. Not so today, when there is evidence to show that tuberculosis is kept alive by a series of local epidemics. Intensive epidemiological study can ferret out the source, the contacts, and the secondary cases not only in households but also in schools, factories, restaurants, business offices, and through the routine X-ray of all patients of hospitals and

clinics. Here are opportunities to break the chain of infection and save the maximum of human suffering and economic loss with the minimum of effort and expense. They should be explored more fully.

Steps Toward Success

It is highly commendable to have developed a more or less standard control program for tuberculosis, or any other disease entity. It will, however, become static and steadily less effective unless we constantly evaluate each part of it. We need to search endlessly for more facts, for new approaches. Even though our battle against tuberculosis has gone well, we are still at the frontiers of knowledge. I suggest, in short, more pinpointing of the predisposing and precipitating factors of the disease and their mechanisms of action, changing our emphasis as new truths become known, adding or subtracting one or another element in the program as knowledge grows and the disease declines.

"To combat consumption successfully," wrote Knopf of Philadelphia in 1901, "requires the combined action of a wise government, well-trained physicians, and an intelligent people." I doubt that his prescription for success can be bettered today. In this time we have set for decision, we have nothing to fear except complacency and dogmatism, nothing to avoid except inflexibility or inaction, and everything to hope for in a greater half century than the one just past.

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Treatment of Tuberculosis

By J. BURNS AMBERSON, M.D.

THE INTRODUCTION of streptomycin into the clinical treatment of tuberculosis in 1944 and the subsequent use of other drugs have led to radical changes in the management of this disease. Indeed, there has been no other comparable period in its history. The momentum originally imparted by the discovery of antituberculosis drugs is still felt, and it would be rash to predict when or where it may spend itself, so swift is the rush of events. It seems prudent, therefore, to characterize the following remarks as more of a commentary than a critique.

In the relatively short time since tuberculous patients first received streptomycin, it has been found possible, by adjusting the dosage and combining its administration with that of para-aminosalicylic acid, to circumvent most of its serious toxic properties, as well as to prolong the antimycobacterial effect through many more months than either drug would accomplish alone. There are now a number of other active

antituberculosis drugs, the most potent of which are isoniazid and viomycin. Consequently, the variety of drug combinations which may be used simultaneously and in sequence becomes large and the task of assessing their efficacy quite formidable.

An accurate evaluation can be arrived at only after patient and sustained efforts in the laboratory and clinic, which will require years. Eagerness for progress should not be permitted to disrupt the methodical, time-consuming pursuit of scientific facts upon which clinical practice ultimately must stand. In dealing with a problem as complex as tuberculosis, a get-wise-quick approach is thoroughly unsound.

Early Favorable Effects

Largely because of the use of specific drugs, the early response of the tuberculous patient to treatment can now be said to be more uniformly favorable, more certainly predictable and, on the average, more rapid than ever before. Whatever the regimen adopted, the first maneuver in treatment is to attempt, as rapidly as possible, to suppress the activity of the tubercle bacillus and thus halt active, progressive disease. The effect of successful treatment is manifested by an abatement of toxemia—allowing the patient to recover his strength and feeling of well-being—and by a gradual restoration of normal physiological processes. Another easily observed effect is the retardation or arrest of active inflammation and destruction of tissue.

The early favorable effects of treatment are often conspicuous. The cough and expectoration may disappear, and drainage from discharging sinuses may dry up completely. The

Dr. Amberson is professor of medicine at Columbia University College of Physicians and Surgeons, attending physician at Presbyterian Hospital, and visiting physician in charge of the chest service at Bellevue Hospital. He received the 1952 Trudeau Medal Award partly for work begun in 1926 and reported in the October 1931 issue of the American Review of Tuberculosis. Discussing the failure of a clinical trial of sanocrysin, a gold salt, Dr. Amberson described the criteria he used to judge the clinical effect of this chemotherapeutic agent against pulmonary tuberculosis. His outline of minimum "clinical, laboratory, and X-ray observations sufficient to warrant any reasonable conclusion from such a study" is as valid now as it was in 1931.

subsidence of inflammation may also be followed by a resolution and absorption of inflammatory products which is remarkable or even dramatic. All this may be observed in the space of 3 or 4 months. But then further regressive changes of the lesions often tend to occur more slowly, and a time may come, perhaps after many more months, when little or no further change is observed, even though the symptomatic recovery is maintained.

Although the early halting of active inflammation and of exudation in and discharge from tuberculous lesions may not be synonymous with the death of the bacteria responsible, these favorable changes nevertheless benefit the patient. At the peak of these effects, necrotic lesions sometimes can be removed surgically without great operative risk. Therefore, one may think of the drying out of lesions as one of the most beneficent, rapid, and striking effects of specific drugs.

Drug Therapy vs. Rest Treatment

The mechanisms of healing under the influence of specific drugs do not appear to be essentially different from those occurring under natural conditions, often favored by a regimen of rest. With minor exceptions, the difference in the early response to treatment does not seem to be qualitative but, rather, a matter of speed and predictability. Thus, the question is raised as to whether these new developments justify or necessitate a change in our ideas regarding the use of rest treatment, which long experience has proved so helpful against tuberculosis.

An answer is difficult because of our limited knowledge of the way in which rest treatment exerts its favorable effects. These effects are vaguely identified as biochemical, hormonal, and general, but not primarily mechanical. Innate factors seem to be vital, and there is reasonable assurance that in most patients these can be raised to better levels by rest treatment and other general measures. If this be so, can specific drug therapy in any way substitute for rest? Certainly, during the early phases of active, progressive tuberculosis, when resistance is low, it seems rational and obligatory to give the patient the benefit of every

available help. It is rather generally agreed, therefore, that rest treatment and general adjuvants are just as important as the administration of drugs, and in many cases probably more so.

Measuring Resistance

Since there is no accurate objective measure of resistance, it is necessary to estimate it almost entirely by clinical judgment based on experience. Although the early response to drug therapy is in most cases consistently favorable, the tendency to relapse after the discontinuance of therapy varies widely in different patients, and this tendency almost certainly is related in part to the level to which resistance has risen. It is much easier, therefore, to identify the time and circumstances initially calling for drugs than it is to identify the time to stop them. In some patients, an early relapse indicates that chemotherapy has been stopped prematurely; in others, it is continued for an unnecessarily long time, ostensibly for safety's sake.

This dilemma illustrates the practical problem of the physician and his patient, who perforce cannot wait for the laboratory to produce a reliable test of resistance. The best test we have now is the tolerance of the patient for gradually increasing activity, especially physical exercise. And since resistance is the only permanent defense against the infection, it is logical to stop chemotherapy (at a time when healing of the disease is judged to be well advanced) before allowing the patient unrestricted activity, and then gradually to test his tolerance of greater liberty under carefully observed conditions. Justification may be found for speeding his return to a productive life or to more prolonged and radical treatment. This is another one of the problems which require long and careful study.

Condition of Tubercle Bacilli

A word should be said about the condition of the tubercle bacilli which remain in tuberculous lesions, particularly those of a solid necrotic character, after the patient has recovered and his disease is called arrested or inactive. It

has long been recognized, on the one hand, that the bacteria may survive there for many decades while the patient remains well. Should a relapse occur, these survivors or their descendants are usually found to be the culprits. On the other hand, the bacteria may eventually disappear from the lesions or, if persisting, they may be found incapable of growth on artificial culture media or of causing disease in susceptible animals. A very lively question at the moment is whether the remaining bacilli are really dead, leaving behind only their skeletal remains, or whether they have merely been so enfeebled and modified by the antagonistic forces of nature that they are unable to keep their tenuous hold on life except in the lesions in which they are found.

How long is required under natural conditions for such changes to occur is largely conjectural, but usually it seems to be a matter of many years. It now appears that the continuous administration during many months of combinations of specific drugs such as streptomycin and para-aminosalicylic acid sometimes exerts similar effects on the bacteria. This observation tempts the most critical scientist to entertain the thought that the bacteria may have been killed by the drugs. It is legitimate to pursue the thought and this is being done in various laboratories. Meanwhile, it seems wise and sound to take the position that sterilization of lesions by drugs has not been proved.

Treatment Principles

In sum, it may be said that even though the patient profits greatly from the use of specific drugs when they are needed and may experience an early halting of serious disease which in earlier days almost always led to chronic illness at best and early death at worst, his ultimate prospects of permanent recovery depend largely on other help which may be given him. Particularly they depend on the effect of rest treatment to build up his resistance for the long battle against the tubercle bacilli which survive in his tissues.

If resistance against infection has risen to a high level during treatment and the residuals of disease are small, the prognosis for permanent recovery is excellent. The recovery un-

der drug treatment of patients whose resistance is poor usually is followed sooner or later by relapse. However, surgical removal of the grossly damaged tissue, if practicable, may effectively turn the balance in such a patient's favor. Obviously, therefore, each case must be considered according to its individual features.

Certainly, a most important principle is to treat the patient with recently developed and limited tuberculosis promptly and sufficiently long to prevent extensive destruction of tissues and chronic disease and to insure the best prospect of permanent recovery. Many of these patients have no symptoms, and their disease is discovered in case-finding surveys or in other routine examinations. Although the rest cure alone has been effective in a great majority, the time required has been long, often a year or more. Now, although recovery may not be speeded greatly by drugs, their use when needed should help assure a permanent arrest of the disease almost uniformly; only a few of such patients will require surgery.

In the more advanced and active cases, reliance is now placed chiefly on the immediate and prolonged use of combined drug therapy to gain early control of the infection and to permit resolution of inflammatory changes. Mechanical procedures such as thoracoplasty and artificial pneumothorax are usually reserved for mechanical problems such as residual unhealed cavities in the lungs. Similarly, surgical resection is preferably reserved for the time when the disease has been brought under control and the remaining problem is the threat of relapse. During this time of waiting, it is to be hoped that the resistance of the patient may rise to a maximum level under treatment so that the permanence of his recovery may be improved or assured.

Another debatable question is the place of the so-called ambulatory treatment. If this could be shown to be adequate, the obvious advantages are that the huge cost of hospital care would be reduced, the patient's morale possibly would be improved, and the patient would not suffer the usual heavy social and economic losses. It is questionable whether these theoretical advantages can be achieved without paying the price of frequent relapse or of long chronic disease

leading to disability and eventually to death. Certainly, the matter should be approached objectively. Almost every conceivable treatment of tuberculosis has been applied in the past to the ambulatory patient. The early favorable response frequently is deceptive, and the opportunity to bring about a permanent recovery is easily lost.

Patients as Sources of Infection

Tuberculous patients with long-established chronic disease who circulate and act as sources of infection in the community represent a serious situation everywhere. As life is saved or prolonged by treatment, the death rate drops but the number of living patients continues to be high, and in fact, rises in some groups, particularly elderly men. Since many of these patients are destined for continuing chronic and eventually fatal disease, the problem of eliminating the source of infection short of the death of the patient must be considered. Giving drugs and thus drying up pulmonary cavities appeals to the imagination as a practical public health measure, and studies of this possibility are under way.

Here again, the only reasonable attitude is an objective one. Thus far, no combination of drugs has proved permanently adequate in preventing open cavitory lesions from discharging bacteria. Furthermore, when a dry cavity

again becomes wet and starts discharging and the patient again starts coughing, he may be spreading drug-resistant strains which, when they infect a previously uninfected person, may produce disease which will not be amenable to drug therapy. The hope would be to circumvent this by resorting to different series of drugs, but the practical feasibility of this course is at best open to debate.

Prospects for the Future

In view of our better understanding of the various modes of treatment and of the outlook for the discovery of new drugs, the future holds brightening prospects for the tuberculous patient. To indulge in the hope of eventually finding an absolute and final cure of the disease would be idle at this time. The methods of study and investigation promising to lead to further knowledge are well known, but the time they require is necessarily long. One thing is certain, though: Progress will be made in laboratories and clinics like those of the Henry Phipps Institute, and the scientists who will achieve that progress will be of the same sterling character as that group at the Phipps which has given it such an illustrious past. We place in their hands, and in those of similarly competent and devoted workers, the privilege and responsibility of coming to grips with the almost limitless problems that remain.

Institute for Federal Hospital Administrators

The seventh Inter-Agency Institute for Federal Hospital Administrators will be held at the Walter Reed Medical Center, Washington, D. C., from October 26 through November 13, 1953. Participating in the institute will be key hospital administrators of the Army, Navy, Air Force, Veterans' Administration, Public Health Service, and the Bureau of Indian Affairs.

Speakers from Government agencies, schools of public health, and university departments of hospital administration will lecture and hold discussion sessions. Individual hospital problems will be analyzed.

International Certificates Of Vaccination

A revision of the immunization form required for international travel was made available in July 1953 by the Public Health Service.

Titled "International Certificates of Vaccination," and approved by the World Health Organization, the revised form provides travelers with a record of their compliance with the vaccination requirements of all nations governed by the International Sanitary Regulations. It contains certificates for vaccination or revaccination against smallpox, cholera, and yellow fever and has space for recording other immunizations such as typhus, typhoid-paratyphoid, plague, and tetanus. The principal changes are:

Smallpox and cholera certificates must bear the approved stamp called for on the certificates. The signature alone of the certifying officer is not acceptable, nor does it make the certificate valid. (In the United States, the approved stamp is that of the local or State health department in the area where the immunizing physician practices, of the Department of Defense, or of a designated yellow fever vaccination center, or it may be the seal of the Public Health Service. If the local health officer does not have an identifying stamp, undoubtedly the State health officer can validate the certificate.)

Only the primary vaccination for smallpox must be inspected and the results recorded. On revaccination, the smallpox certificate is immediately valid, whereas previously a 14-day wait was required.

The cholera certificate becomes valid beginning 6 days after the first injection or immediately in the instance of revaccination. Previously, the entire injection series had to be completed before the certificate became valid. (In the United States, two injections are given

for the initial series. Travelers are advised to take the second inoculation because the type of vaccine used in this country provides maximum protection only after the second injection.)

The period of validity for the yellow fever vaccination certificate has been extended from 4 to 6 years. (In the United States, yellow fever vaccination certificates are valid only when the inoculation is obtained from a yellow fever vaccination center designated by the Public Health Service. The international regulations require a nation to designate specific vaccination centers for this purpose and to use vaccine approved by the World Health Organization.)

The text is printed in both English and French, but entries may be completed in either language.

The new form is distributed with all passport applications issued by the clerks of the court in any city in the United States and by the passport agencies of the State Department in Boston, New York City, San Francisco, New Orleans, Chicago, and Washington, D. C. It may also be obtained from local or State health departments and from Public Health Service facilities. It is identified by number as PHS-731, revised November 1952. Copies may be purchased from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C., for 5 cents each, or \$2.50 a hundred.

Travelers to countries where passports are not needed but where immunization is required may also obtain the form from the above sources.

Although the new form replaces the previous International Certificate of Inoculation and Vaccination, the old form will be acceptable in international travel until the expiration date of recorded examinations. Also, agencies still holding stock of the old form may continue to distribute it until the supply is depleted. Inquiry concerning use, distribution, and availability of the new form and restrictions on the use of the old certificate should be directed to the Division of Foreign Quarantine, Bureau of Medical Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C.

*Prepared by the Division of Foreign Quarantine,
Bureau of Medical Services, Public Health Service.*

Distribution of Hospital Nursing Services

By HELEN G. TIBBITTS, M.A.

THE NEED FOR more nurses in hospitals is a familiar problem. As a result, sometimes hospital beds have been closed, but more often the available nursing services have been spread more thinly over the existing patient load. The American Hospital Association reports that at the end of 1951, nearly 14,000 hospital beds were closed for lack of personnel and that job vacancies existed for 22,486 graduate nurses (1), 10 percent of the total number already employed in hospitals. These data, collected by the American Hospital Association, cannot be used to show the amount of nursing care patients are receiving, but data from the 1951 American Medical Association's census of registered hospitals can be used for this purpose, and so round out the picture.

The American Medical Association has made available to the Public Health Service unpublished data on patient census and nursing personnel, which show the geographic locations and hospital types in which those patients are concentrated who are receiving less care than the nursing profession's standards recommend. Such standards have been set forth for three distinct types of hospitals: general and allied special, nervous and mental, and tuberculosis. For general and tuberculosis hospitals the standards are in terms of hours of care per patient-day, and for mental hospitals they are in terms of a nurse-patient ratio. While the nursing profession recognizes that these stand-

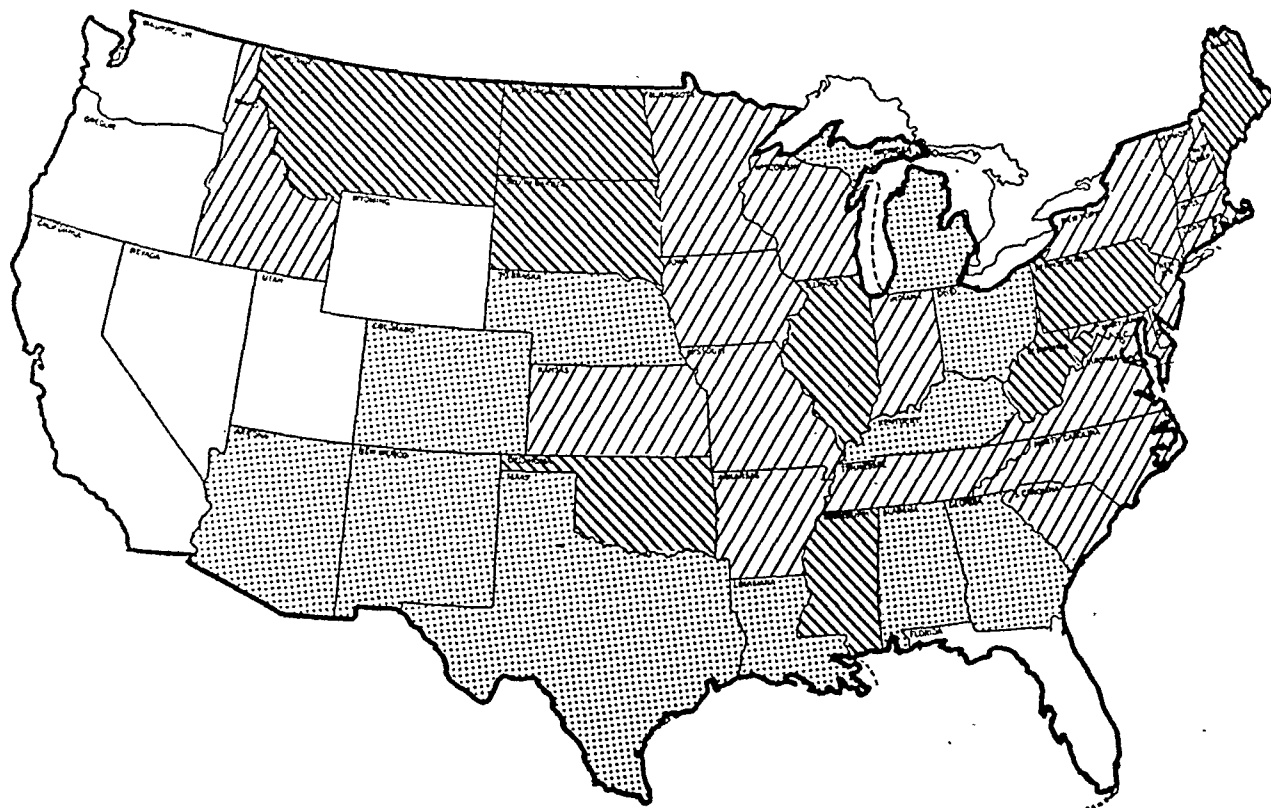
ards are not based on adequate data, they are the only guidelines available at this time. The standards are in fairly general use pending the results of studies now under way or contemplated.

Nurse-patient ratios have been computed for each type of hospital from data supplied by the American Medical Association. The nursing personnel included in these ratios are limited to nurses available to give direct care to patients. General duty nurses are the only professional nurses included. The nonprofessional personnel include practical nurses, attendants, nurses' aides, and orderlies. The care given by student nurses is excluded from the nurse-patient ratios developed from the American Medical Association data. The personnel counts are as of a particular day in October 1951, while the number of patients was counted as the daily average patient census for the most recent 12-month period for which data were available at that time. An adjustment is made for part-time general duty nurses so that personnel counts would be on a full-time basis. No adjustments are made for care given by private duty nurses, and to offset this, no adjustments are made for newborn census.

The ratios computed from the data for hospitals registered by the American Medical Association have been converted by a very simple process into estimates of average hours of care received by patients: For hospitals whose nurses work an average of 44 hours a week and 48 weeks a year, the average hours of care per patient-day is one-seventeenth of the number of nursing personnel per 100 patients. For hospitals that average a 40-hour week, the average hours of care is one-nineteenth of the ratio. For example:

Mrs. Tibbitts was statistical analyst with the Division of Nursing Resources at the time this study was made. She is now with the Health Resources Staff of the Office of Defense Mobilization.

Figure 1. Estimated daily hours of total nursing care per patient in nongovernmental general hospitals, 1951.



Estimated Daily Hours of Care 44-Hour Work Week



In States where nurses work 40 hours a week, each nurse works 1,920 hours per year (40×48). The number of patient-days per year is the product of 365 multiplied by the daily average patient census. If we let R stand for the number of nursing personnel per 100 patients, C stand for the average hours of care per patient-day, NP for the total number of nursing personnel, and $DAPC$ for the daily average patient census, the following relationships can be stated:

$$(1) R = \frac{100NP}{DAPC} = 100 \frac{(NP)}{(DAPC)}$$

$$(2) C = \frac{1920NP}{365DAPC} = \frac{1920}{365} \frac{(NP)}{(DAPC)}$$

$$(3) \frac{R}{100} = \frac{NP}{DAPC} \text{ (from 1 above)}$$

$$(4) C = \frac{1920}{365} \times \frac{R}{100} = \frac{R}{19}$$

Data are shown in this report in terms that make them comparable to professional standards for nursing service for each of the three types of hospitals. Comparisons are made be-

tween the staffing of Federal hospitals, other governmental hospitals (includes those administered by the Bureau of Indian Affairs), and nongovernmental hospitals for each of the three types of service. Where figures are quoted in terms of hours of care given, they are based on the assumption that nurses in Federal hospitals work a 40-hour week and that nurses in other hospitals average a 44-hour week.

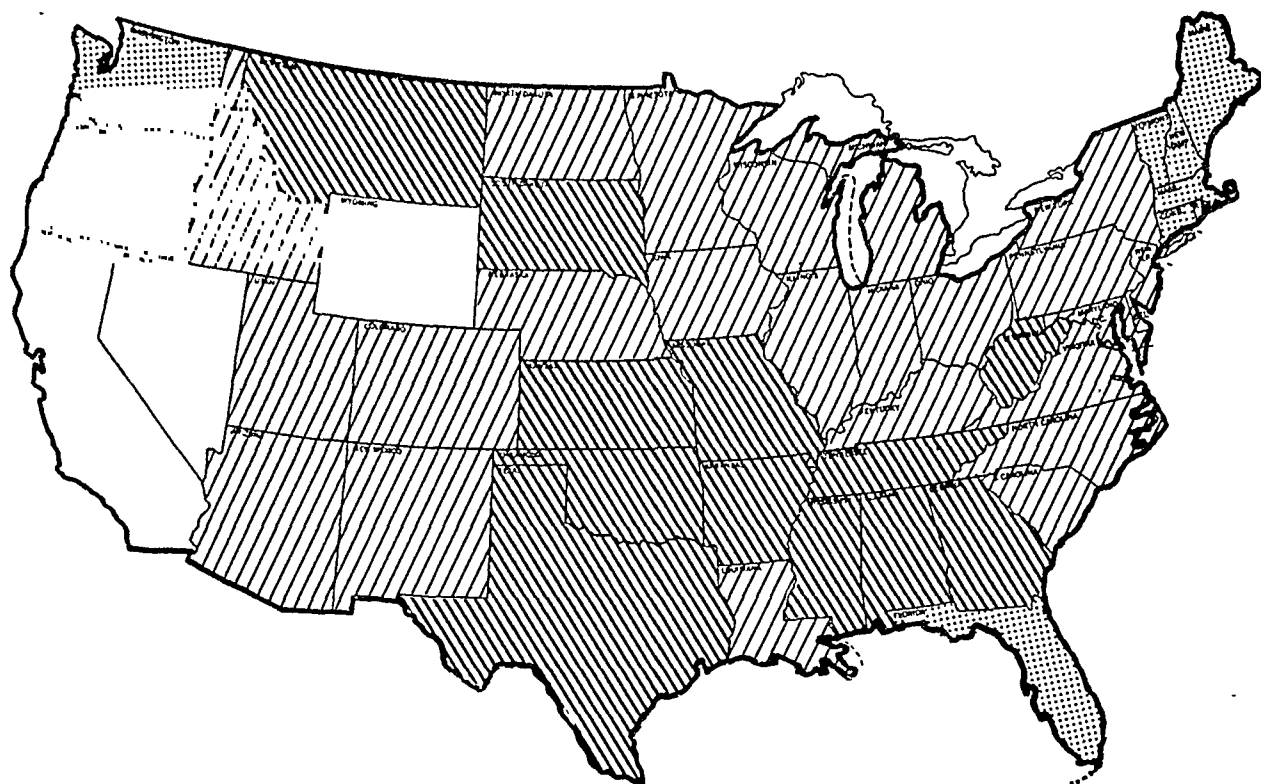
General and Allied Special Hospitals

The variations in hours of nursing care per patient-day available in hospitals under different types of control and the number of patients affected are as follows:

Control	Patients (in thousands)	Hours of care ¹	
		Total	Professional
Federal.....	96	2.1	0.7
Other governmental....	119	2.8	.9
Nongovernmental.....	294	3.6	1.6

¹ Reference 9.

Figure 2. Estimated daily hours of professional nursing care per patient in nongovernmental general hospitals, 1951.



Estimated Daily Hours of Care
44-Hour Work Week



This picture of the situation in general hospitals shows that patients in Federal hospitals and those in other governmental hospitals are receiving not more, but actually less, nursing care than are patients in nongovernmental hospitals.

The average length of stay of patients in Federal hospitals is about three times as long as in nongovernmental hospitals. Long-term patients usually need less nursing care than short-term patients. However, obstetrical cases make up about one-fifth of the admissions to nongovernmental hospitals and only one-fifteenth of the admissions to Federal hospitals, and such cases are characterized by shorter than average stay and less than average acuity. Furthermore, in Public Health Service hospitals (data are not at hand for other Federal hospitals), the median length of stay is only about one-half the average stay; and of the 80 percent of patients who are discharged in less than 1 month the

average stay is considerably less than one-half the average stay of all patients.

If an adjustment were made for the care given by student nurses, the difference between the amounts of nursing care available to patients in governmental hospitals of both types and those in nongovernmental hospitals would be more pronounced.

Information from other sources indicates that on a national basis student nurse care averages about 0.5 hour per day for each patient in general hospitals, and that 86 percent of it is concentrated in the nongovernmental hospitals. The breakdown of these figures follows:

State surveys made by the Division of Nursing Resources, Public Health Service, corroborated by evidence from the 1950 list of State Approved Schools of Nursing, indicate that a student nurse gives care to patients .4 as many hours as a graduate nurse employed on a full-time basis by the hospital. This means that the 102,500 students enrolled on January 1, 1951, were spending as many hours giving care to

patients as 41,000 full-time nurses employed by the hospitals, or 86,592,000 hours a year, based on average personnel policies in nongovernmental hospitals. The 509,448 patients in general and allied special hospitals received 185,047,790 days of care in the year, or .47 hours per patient-day from student nurses.

The concentration of student care in nongovernmental hospitals can be inferred by the control of the hospitals operating the schools in which the students are enrolled. Of the 97,903 students reported in *Facts About Nursing* to have been enrolled in schools of nursing January 1, 1950, 13,561 were enrolled in schools operated by Federal, State, city, county, or city-county hospitals. The control of the hospitals with schools was determined from the list of hospitals registered by the American Medical Association, and their enrollments from the 1950 list of State Approved Schools of Nursing.

A conservative estimate is that patients in nongovernmental hospitals probably average .4 hour of care daily by student nurses, which brings the total hours of care they are receiving up to 4 a day, about one-half of it being professional.

The average staffing of nongovernmental hospitals, computed by totaling personnel and patients in this entire group of hospitals, appears to meet the standards set by the nursing profession in 1948 with respect to total hours of nursing care although not in number of professional nursing hours. A study published by the National League of Nursing Education in that year indicated that each patient should have 3.5 hours of care per day, with 2.4 of these hours provided by professional nurses (7).

A more recent study indicates that under specified conditions of assignment and supervision professional care may be sufficient if it is one-third of the total (6), and another shows that patients on active medical and surgical service require 3.9 hours of care (10). A definitive study is needed now to relate amounts of nursing service to the demands of modern medical practice, but in the last analysis each hospital has, and will continue to have, different requirements.

The staffing ratios presented here are averages for large groups of hospitals; and hence, as would be expected, many hospitals in any group will have ratios lower than the group average. The extent to which nongovernmental hospitals fail to meet the standards of the nursing profession for general hospitals is sketched

in briefly following the discussion of geographic variations.

Nervous and Mental Hospitals

Patients are distributed among the three classes of nervous and mental hospitals in inverse relationship to the amounts of nursing care available:

Control	Patients (in thousands)	Nursing personnel per 100 patients ¹	
		Total	Professional
Federal-----	60	26.2	2.9
Other governmental---	621	11.5	.3
Nongovernmental----	17	33.9	4.2

¹ Reference 9.

In contrast to the situation in general hospitals, patients in Federal mental hospitals are receiving considerably more care than patients in other governmental hospitals. It remains true that patients in nongovernmental mental hospitals are receiving the most care.

The standard approved by the American Psychiatric Association in 1945 for staffing mental hospitals called for 4 professional nurses per 100 patients, and 25 nonprofessional nursing personnel (4). The great majority of mental patients in the hospitals operated by States and other local governments thus is receiving less than one-tenth the professional nurse care and only two-fifths of the total amount of care considered essential.

While on the face of it, the average staffing ratios of nongovernmental mental hospitals appear to meet the standards quoted, it must be realized that these hospitals generally are undertaking intensive therapy for a much larger proportion of their patients than the State mental hospitals for which the standards were designed. The American Psychiatric Association has since developed a more discriminating set of standards, but they can be used only in a situation in which something is known of the condition of the patients in addition to their total number (3).

Tuberculosis Hospitals

The patient with tuberculosis receives the most care in a Federal hospital, and the least care if he is in a nongovernmental hospital:

Table 1. Average hours of nursing care by all types of nursing personnel, except student nurses, per patient-day and distribution of hospitals according to actual hours provided: nongovernmental general hospitals in 8 States

State	Average hours	Hospitals distributed by actual hours care					
		Total	Less than 2.0	2.0-2.9	3.0-3.9	4.0-4.9	5.0 and over
Arizona.....	4.3	11	-----	1	3	3	4
District of Columbia.....	4.2	12	-----	1	5	5	1
Maine.....	3.2	28	3	3	12	7	3
Nebraska.....	3.9	71	1	11	25	12	22
New Mexico.....	3.8	18	1	4	6	2	5
South Dakota.....	2.9	35	2	6	15	7	5
Vermont.....	3.4	18	1	6	3	6	2
West Virginia.....	3.1	48	2	8	21	14	3

Control	Patients (in thousands)	Hours of care ¹	
		Total	Professional
Federal.....	8	1.8	0.6
Other governmental....	58	1.4	.2
Nongovernmental.....	8	1.2	.2

¹ Reference 9.

On the basis of standards of the Tuberculosis Advisory Nursing Service, even the better staffed Federal tuberculosis hospitals are short of professional nurses (5). These standards are based upon the regimen prescribed for patients, that is, whether the patient is on strict bed rest, that is, whether the patient is on strict bed rest, bed rest, or is semiambulant, or ambulant. To obtain a single figure from these four standards so that comparison could be made with existing staffing practices, the nursing requirement of patients in each category was weighted by the probable proportion of all patients in the category. The weighted average nursing requirements of tuberculosis patients amounts to

a total of 1.8 hours of care per day, .9 hour of which should be professional nurse care.

Geographic Variations

All of the figures cited so far have been national averages. It is reasonable enough to use national averages when discussing Federal hospitals since their centralized administration means that there is relatively little local variation in staffing ratios.

What justification is there, however, for computing a single ratio by combining data for 48 States from Arkansas to Maine and from Georgia to California? A comparison of the ratios for nongovernmental general hospitals across the country suggests part of the answer (9). Figure 1 shows some geographic variations in the ratios of total nursing personnel to patients. The ratios have been grouped into

Table 2. Average hours of care by graduate nurses per patient-day, and distribution of hospitals according to actual hours provided: nongovernmental general hospitals in 8 States

State	Average hours	Hospitals distributed by actual hours care					
		Total	Less than 2.0	2.0-2.9	3.0-3.9	4.0-4.9	5.0 and over
Arizona.....	1.9	11	1	3	3	-----	4
District of Columbia.....	2.2	12	-----	4	3	5	-----
Maine.....	2.0	28	6	3	2	5	12
Nebraska.....	1.5	71	14	16	22	11	8
New Mexico.....	1.6	18	3	8	2	2	3
South Dakota.....	1.1	35	12	8	5	5	5
Vermont.....	2.2	18	1	3	2	5	7
West Virginia.....	1.1	48	14	22	8	4	-----

Table 3. Nongovernmental general hospitals with schools of nursing distributed according to hours of care provided per patient-day by student nurses in 8 States

State	Total hospitals	Hours care by student nurses				
		Less than 1.0	1.0-1.4	1.5-1.9	2.0-2.4	2.5 and over
Arizona.....	5	-----	1	3	1	-----
District of Columbia.....	5	4	-----	1	-----	-----
Maine.....	4	-----	2	2	-----	-----
Nebraska.....	12	5	4	3	-----	-----
New Mexico ¹	-----	-----	-----	-----	-----	-----
South Dakota.....	9	-----	5	2	2	-----
Vermont.....	6	2	2	1	1	-----
West Virginia.....	19	5	7	6	1	-----

¹ Only one hospital operates a school of nursing, and to avoid disclosing confidential information, data are not shown.

four classes for mapping purposes. The States with the lowest ratios have fewer than 55 nursing personnel of all types available to care for each 100 patients. This means that in these States if nurses work 44 hours per week, patients can receive an average of less than 3.2 hours of care per day. Patients in the next higher States can receive 3.2 to 3.7 hours; in the next to the highest group of States they can receive 3.8 to 4.0 hours, and in the highest States, 4.1 hours or more are available.

Figure 2 shows similar variations in graduate professional nurse to patient ratios. In the States with the lowest ratios, fewer than 22 graduate professional nurses care for each 100 patients. That is, patients in these States can average less than 1.3 hours professional nurse care each day. Patients in the next group of States can average 1.3 to 1.9 hours professional nurse care daily, in the next higher group, 2.0

to 2.5 hours, and in the most privileged States they can average 2.6 hours or more.

Interhospital Differences

It cannot be inferred that a State whose average nurse-patient ratios provide for amounts of care that meet professional standards has all the nurses it needs in its hospitals. Nurses are not distributed among all hospitals in proportion to the number of their patients, and no assumption is made that this should be so (tables 1 and 2). Admittedly, the patients in some hospitals need more care while those in other hospitals may need less, depending upon the conditions for which they are being treated, the nature of the treatment, and the hospital's program.

The safest assumption probably would be that the patients in any general hospital need at

Table 4. Hospitals distributed according to total hours of care provided per patient-day, including care given by student nurses: nongovernmental general hospitals in 8 States

State	Total hospitals	Total hours care				
		Less than 2.0	2.0-2.9	3.0-3.9	4.0-4.9	5.0 and over
Arizona.....	11	-----	1	3	3	4
District of Columbia.....	12	-----	-----	6	5	1
Maine.....	28	2	4	9	7	6
Nebraska.....	71	1	7	22	18	23
New Mexico.....	18	2	4	6	2	4
South Dakota.....	35	2	8	12	8	5
Vermont.....	18	-----	1	8	7	2
West Virginia.....	48	2	11	20	10	5

least the amount of care that would be equivalent to the nursing profession's 1948 standard for total hours of care and Bredenberg's standard for hours of professional nurse care. The corollary of this assumption is that hospitals providing more hours of care than this do so either because of the kind of care their patients need, out-of-date facilities for care, awkward administrative procedures, educational programs for student nurses or medical students, or for a variety of other possible reasons. Thus, in Nebraska, although the State average meets professional standards for total hours of care, at least 12 hospitals could be considered inadequately staffed.

Differences in the extent to which student nurses give patient care show up in table 3. Table 4, when compared with table 1, shows how including the care given by students in the total hours affects the picture of the amount of care patients are receiving.

Summary

1. The ratio of nursing personnel to patients in the entire group of nongovernmental general hospitals in the country is sufficient to provide an average of 3.6 hours of care, 1.6 hours of this being professional. Nevertheless, numerous hospitals in every State need more of both categories of nurses even where statewide ratios are at the national average. Only in the Pacific coast States and in Nevada, Wyoming, and Florida do patients in general hospitals appear to be receiving an average amount of both professional and nonprofessional nursing care that is up to minimum professional standards. In the New England States the average amount of professional nursing care appears to be sufficient, but hospitals in this area perhaps should employ more nonprofessional nursing personnel. In all of the remaining States there appear to be too few graduate nurses in the general hospitals.

2. All general hospitals under governmental control of any sort appear to be short of both professional and nonprofessional nursing personnel, although the longer average length of stay in Federal hospitals modifies the picture to some extent.

3. In the mental hospital field, only those under nongovernmental auspices come close to meeting the staffing standards of the nursing profession, and these hospitals care for only 17,000 of the 698,000 patients in this kind of institution.

4. Tuberculosis hospitals in all three classes appear to be grossly understaffed with respect to both professional and nonprofessional nurses.

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Occupational Disease Reporting

By VICTORIA M. TRASKO

THE STUDY and control of occupational diseases in the United States has progressed markedly in the past four decades. A vast body of information, both clinical and toxicological, has been developed, particularly on such diseases as silicosis, dermatoses, and poisoning due to lead, benzol, beryllium, and hundreds of other toxic substances. Scientific knowledge concerning the environmental control of these diseases is likewise well developed, although its application is yet far from universal. An exception to these notable gains has been the ineffectual attempt to obtain adequate morbidity data on occupational diseases.

The value of universal morbidity statistics on diseases, whether communicable, chronic, or occupational, is unquestioned in public health planning, in developing control programs, and in aiding the passage of pertinent legislation. Though incomplete, statistics based on early pioneering studies of occupational diseases and general sickness have been sufficiently impressive to interest governmental agencies and other groups in the improvement of working conditions and in raising the health level of workers.

Miss Trasko, public health adviser to the Division of Occupational Health, Public Health Service, and a member of the division's staff since 1938, has had varied experience in industrial hygiene activities in this country and South America.

This paper is based on Public Health Service Publication No. 288, Occupational Disease Reporting—A Review of Current Practices, Together With a Collection of Incidence Statistics, also by Miss Trasko. Detailed analyses of the information presented in this article will be found in the full publication, now in press.

In fact, the recognized prevalence of silicosis and its association with tuberculosis was one of the main reasons for the establishment by the Public Health Service of an "office of industrial hygiene and sanitation" in 1914.

Despite their limitations, occupational disease statistics have also influenced the adoption of legal measures to control the use of toxic substances known to cause illness among exposed workers, and to regulate general working conditions. Beyond that, however, the absence of reliable data on the prevalence of occupational diseases has made impossible a definition of the overall industrial disease problem and a reasonable determination of where toxicological and clinical research is needed.

Industrial hygienists have long recognized this hindrance, and representatives of State and local industrial hygiene units, medical directors of private industries, representatives of insurance companies, and others have, for many years, urged the Division of Occupational Health of the Public Health Service to undertake a study of the prevalence and reporting practices of occupational diseases in the United States. Finally, because of the long-sustained need and in view of the fact that the situation was remaining static, such a project was undertaken in 1949.

One of the phases of this project dealt with a review of the status of required reporting by physicians to State and local agencies. The second phase dealt with an experimental pilot study originally undertaken to test the feasibility of developing a national reporting system for occupational diseases. In addition, the project has also encompassed the collection of all available statistics on occupational diseases.

Required Reporting of Occupational Diseases

An accepted method of obtaining information on the incidence of diseases is through required or universal reporting by practicing physicians. While a fair degree of success may have been experienced through the reporting of communicable diseases, required reporting on the whole is not considered an effective device. For occupational disease statistics and prevention purposes, this method has produced discouraging results.

The idea has been expressed that required reporting will never be successful unless it is associated with reasons other than that of collecting statistics (1,2). The administration of workmen's compensation laws in this country provides this incentive, since the reporting of essential information concerning the cause and nature of accidents and diseases is required of the physician, employer, and worker before benefits can be paid for the disability incurred. There is no doubt that reporting for compensation purposes is more successful, at least quantitatively, than compulsory reporting, despite the relatively long reporting experience in this country and the fact that more than one-half of the States require reports.

At the present time, 27 States have legislation or regulations requiring physicians to report one or more occupational diseases to health or labor authorities. According to available information, several States, including New York, Michigan, and Wisconsin, passed their first laws in 1911. The Maryland law was first enacted in 1912; the New Hampshire law, in 1913; and the Rhode Island law, in 1915. Ohio requires reports to both the State department of health and the industrial commission. The department of health law dates to 1913 and the industrial commission law, to 1921. While many of these earlier laws have been revised and broadened, a few are still in force in their original forms. About one-half of the 27 States that now have laws or regulations enacted them after 1936, when the passage of the Social Security Act made funds available for the establishment of public health programs, including industrial hygiene. These reporting laws were passed to facilitate the efforts of the State industrial hygiene agencies in obtaining occupa-

tional disease reports for investigative purposes.

Many reasons are attributed to the ineffectiveness of required notification of occupational diseases. Among these are difficulties of recognition and diagnosis. Limited knowledge of occupational diseases, of industry itself, and of materials handled and manufacturing processes involved contribute to lack of reporting. Moreover, it is probable that many physicians are of the opinion that reporting occupational diseases violates the confidence of the physician-patient-employer relationship. Other factors are lack of standardization, nonenforcement, and other shortcomings of the laws themselves.

Reportable Diseases

Contrary to the practice in communicable disease reporting, there is no standardized pattern among the States for occupational disease reporting. For instance, all occupational diseases, with or without definitions and qualifications, are reportable in eight States (Georgia, Louisiana, Massachusetts, Michigan, Mississippi, Montana, South Carolina, and Utah). In six States (Alabama, Arkansas, Colorado, Iowa, Missouri, and New Mexico) the reportable diseases are named. In Arkansas, the list corresponds to the schedule of compensable diseases covered by the State workmen's compensation law; in the other five States, the list bears little or no resemblance to the schedules, since most reporting laws were passed before occupational diseases became compensable. In two States, New Jersey and Pennsylvania, the compulsory reporting is limited to lead poisoning.

Reporting laws in the remaining 11 States appear to be patterned after the British Factory and Work Shop Act of 1895, which requires reporting by the medical practitioner of anthrax, and of poisonings by lead, phosphorus, and arsenic (3). New York and Wisconsin seem to have used this basic pattern, later adding mercury poisoning and compressed air illness to the list. The laws in the other nine States (Connecticut, Kansas, Kentucky, Maine, Maryland, Minnesota, New Hampshire, Ohio, and Rhode Island) follow the New York-Wisconsin pattern but have added poisoning due to brass and wood alcohol, and conclude with

the phrase "any other disease contracted as a result of the nature of employment."

An interesting reporting device used by Ohio, Missouri, Pennsylvania, and New Jersey is a law which requires that physical examinations be made periodically of workers exposed to certain toxic substances, and that all cases of poisoning thus found be reported both to the State health and the State labor authorities. In Ohio, New Jersey, and Pennsylvania the law applies to exposure only to lead and its compounds; in Missouri, the law is more inclusive and covers exposures encountered in the manufacturing or processing of antimony, arsenic, brass, copper, lead, and other substances.

Recipients of Reports

Another shortcoming which possibly bears on the limited success of current reporting is the lack of uniformity as to whom the reports are to be made. Legal provisions in 17 States require that reports be made to the State health officer; in 2 of these States, the local health officer is also mentioned. In 6 States, the local health officer is named as the exclusive recipient. Experience has shown that unless the local health department has its own occupational health program there is less chance that reports of occupational diseases will be made, since the incentive to encourage reports is lacking. Moreover, the few reports that might be made directly to local health departments usually reach the State industrial health agency responsible for their investigation either late or not at all, or in a summary form along with other notifiable diseases.

In Ohio, physicians are required to report occupational diseases both to the State department of health and to the State industrial commission, in accordance with separate laws. In actual practice, however, the commission receives from physicians only those reports which involve claims. In two other States, Massachusetts and New York, physicians are required to report to the State department of labor. In New Jersey, Pennsylvania, and Ohio, separate statutes make lead poisoning reportable to both the State health and the labor authorities.

Several of the State laws provide for an exchange of reports. According to the Massachusetts law, copies of reports of occupational

diseases made to the department of labor may be referred to the State department of health on request; in three States, Missouri, New Hampshire, and Ohio, copies of reports made to the State health department must be transmitted to the State labor authorities.

Extent of Present Reporting

A canvass of occupational disease reporting showed that slightly less than 1,800 cases of occupational diseases were reported by physicians to health departments during 1950 or 1951. Moreover, 1,695, or 94 percent, of these cases were reported by three States, Connecticut, Michigan, and Ohio, the rest being reported by Colorado, Kentucky, Minnesota, and Montana. Eighteen States with reporting laws received an occasional report or none at all. In fact, some of these States have never received an occupational disease report, despite continued efforts to solicit cooperation. New York and Massachusetts were not included in the above tabulations because they indicated that the reports received were too few to have any statistical significance.

A crude index of under-reporting by physicians in the past as well as at present is furnished by a few States that have kept continuous records of reports received, as contrasted with the number of occupational disease claims filed or awarded by compensation authorities. For example, in 1942, the Ohio Department of Health received 1,637 reports of occupational diseases from physicians (4). This figure may be considered fairly representative for the State, since it closely approximates the average number of reports that had been received annually by the department in the 10-year period 1928 through 1937 when 12,931 cases were reported (5). In contrast, the Ohio Industrial Commission in 1942 received 5,597 occupational disease claims for compensation. The contrast was further borne out in 1950, when the Ohio Department of Health received 482 reports from physicians and the industrial commission, 4,574 claims for compensation.

The experience in Minnesota shows similar discrepancies; 61 reports were made to the State health department in 1950, as contrasted with 1,931 cases of occupational diseases closed by the industrial commission. Michigan has had a

comparable experience. The State's present occupational disease reporting law was passed in 1937, also the date of the enactment of its occupational disease compensation legislation. Under this reporting law, according to the records of the division of industrial hygiene of the Michigan Department of Health, physicians made the following reports:

<i>Year</i>	<i>Number cases</i>	<i>Year</i>	<i>Number cases</i>
1939-----	1, 110	1945-----	793
1940-----	1, 034	1946-----	553
1941-----	1, 482	1947-----	775
1942-----	933	1948-----	613
1943-----	2, 742	1949-----	513
1944-----	1, 358		

During the 2 years, 1950 and 1951, covered by the pilot study, 1,074 reports were received, including cases uncovered during field studies and not otherwise reported, as well as cases of silicosis reported as a result of general X-ray surveys. According to the biennial report for the fiscal years 1948-50, the Michigan Workmen's Compensation Commission received reports of 1,993 compensable industrial diseases. Although the 2-year periods are not the same, these figures likewise indicate a large degree of under-reporting by physicians.

In Connecticut, figures for the 1937 fiscal period showed that physicians reported 127 cases of occupational diseases; during the same year, compensation claims were paid for 286 cases which were not among those reported (6). Comparable data for more recent years are not available. However, as a result of checking physicians' reports against compensation reports, the Connecticut industrial health agency has found that many of the later occupational diseases, too, have not been reported as required by law. It should be pointed out that the experience in Connecticut is unique because the number of cases reported in 1951 increased instead of decreasing or remaining at the same level. The number of reports generally received from physicians averages 300 a year. However, as a result of more contact with physicians during the 2 years that the Connecticut Bureau of Industrial Hygiene participated in the pilot study, the number of cases reported went up to 749 in 1951. This development certainly suggests the possibility that compulsory

reporting of occupational diseases might have some merit, if encouraged actively.

Reporting of occupational diseases to the State department of public health is not required by law in California, but this State's experience is cited to show the difficulty of drawing valid conclusions from State statistics on occupational diseases. According to the interpretation of the State Workmen's Compensation Act, all illnesses arising out of conditions of employment are defined as injuries. As such, they are compensable and legally reportable to the California Department of Industrial Relations by both employers and physicians. Of special interest here are reports made by physicians of all injuries they treat which result in a disability of 1 day or longer or require medical treatment other than first aid. The department of industrial relations has been referring all occupational disease reports of this type to the bureau of adult health of the California State Department of Health for more than 15 years. The volume of reports of occupational diseases made and referred surpasses that of any other State in the country. Annual tabulations of the bureau show that for the 1939 fiscal year, 4,231 reports of occupational diseases were tabulated; during the calendar year 1944, the number was 11,893; during 1949, it was 12,536; in 1950, 12,245; and in 1951, 14,777. Between 50 and 55 percent of the cases referred were dermatoses.

To what extent this continuing rise in the number of cases reported represents a real increase in the occupational disease problem is difficult to say. No doubt, increased compensation benefits, improved methods in handling reports, and selectivity of cases falling into occupational disease categories are factors reflecting improved figures. On the other hand, California has experienced a tremendous upswing in industrialization and, as a consequence, an increase in the labor force. This growth undoubtedly has contributed to a potentially greater problem with respect to some occupational health conditions.

The Pilot Study

The pilot study represents the only known effort at uniform collection of occupational dis-

cases over a period of time, involving a group of States with various methods of obtaining reports. The pilot study was carried out in cooperation with divisions of industrial hygiene in 11 State health departments (Connecticut, Florida, Georgia, Indiana, Michigan, Missouri, New Hampshire, Oregon, South Carolina, Tennessee, and Wisconsin), selected to afford average representation of different reporting practices. The study covered the calendar years 1950 and 1951, during which time the participating States transmitted on special forms to the Division of Occupational Health, Public Health Service, individual reports of occupational diseases coming to their attention.

The pilot study was made to determine the feasibility of developing a nationwide reporting system on occupational diseases. Originally, it had been planned to consider only required reports from physicians. When it was determined, however, that few reports were being made by physicians, it became clear that a successful national reporting scheme would have to consider other sources of reports as well. The inadequacy of sole reliance on physicians' reports has been realized for a long time by State industrial health agencies, and they are presently depending on workmen's compensation agencies for reports of cases that occur in industry. Consequently, to reflect actual reporting practices in the States, the base of the pilot study was broadened to include reports referred from workmen's compensation authorities.

During the 2-year period covered by the study, 9,058 reports of occupational diseases were submitted by the 11 States. Of this total, 77 percent consisted of reports referred to the health departments by compensation agencies. Reports to health departments by physicians accounted for only 20 percent; the remaining 3 percent comprised reports of cases encountered or reported unofficially during investigations of occupational health hazards, reports of pneumoconiosis uncovered through mass X-ray surveys, and some reports of cases taken from death certificates.

The reports received may be considered typical of the kind of reports of occupational diseases being made today. The quality varied from State to State as well as within individual areas, depending on how the report

originated. Differences cannot be ascribed to any one cause; they are due to many factors inherent in the recognition and reporting of occupational diseases. In general, physicians' reports were likely to be weak on etiology; employers' reports, on the nature of the disease. In many instances, better reports resulted when the information was abstracted from both employers' and physicians' reports. While omissions, inaccuracies, and incompleteness were found in all types of reports, they were observed more frequently in reports made in connection with claims for compensation than in others. Most unsatisfactory probably were statements on the cause or substance responsible for the occupational disease.

Occurrence in Companies

The 2 years covered by the pilot study afforded a good opportunity to observe the frequency with which cases are reported from the same plants over such a period. The distribution of companies according to the number of cases of alleged or suspected occupational diseases occurring per company, as reported by 10 States in the pilot study, is shown in table 1.

Three-fourths of the 3,654 companies reported one case, their total accounting for 36 percent of all the 7,590 reports. At the other extreme, 10 or more cases were reported by 2.2 percent of the companies and accounted for 29.7 percent of all the alleged diseases reported.

In Michigan, where physicians' reports made up the largest number, 18 companies were responsible for 703 cases. It is assumed that the

Table 1. Number and percentage of occupational disease cases occurring per company, pilot study, 1950-51

Number of cases occurring per company	Companies		Cases	
	Number	Percent	Number	Percent
Total.....	3, 654	100. 0	7, 590	100. 0
1 case.....	2, 733	74. 8	2, 733	36. 0
2 cases.....	461	12. 6	922	12. 1
3 cases.....	159	4. 3	477	6. 3
4 cases.....	79	2. 2	316	4. 2
5 cases.....	55	1. 5	275	3. 6
6 to 9 cases.....	86	2. 4	611	8. 1
10 cases and over.....	81	2. 2	2, 256	29. 7

Table 2. Occupational disease cases reported by 13 companies in Michigan, pilot study, 1950-51

Company	Employment	All cases	Dermatitis	Hernia	Pneumoconiosis	Tenosynovitis
A-----	?	10	2	1	7	-----
B-----	21,500	199	199	-----	-----	-----
C-----	7,000	8	-----	-----	8	-----
D-----	?	40	37	2	1	-----
E-----	41,000	68	1	67	-----	-----
F-----	12,000	22	21	-----	1	-----
G-----	?	28	28	-----	-----	-----
H-----	7,500	11	2	-----	9	-----
I-----	?	45	21	-----	24	-----
J-----	20,000	20	2	-----	18	-----
K-----	10,000	38	37	-----	1	-----
L-----	75,000	83	7	1	75	-----
M-----	6,000	43	12	19	-----	12

same person or persons in these companies made the reports, although there may have been exceptions. Data on employment were not furnished for all 18 companies, but most of them employ several thousand workers each and have their own medical departments.

The reporting experience of 13 of these Michigan companies, all manufacturing automotive transportation equipment, revealed that there is a distinct tendency for some physicians to report only one kind of occupational disease and other physicians another kind (table 2).

Moreover, there is little relation between the number of workers employed and the number of cases reported, regardless of the type of case. Company B with an employment of 21,500 workers reported 199 cases, all of which were dermatitis. Company E with 41,000 employees reported only one case of dermatitis and 67 cases of hernia. Company L with 75,000 workers reported 75 cases of pneumoconiosis, 7 of dermatitis, and 1 of hernia. Company M with 6,000 workers reported 12 cases of dermatitis, 19 of hernia, and 12 of tenosynovitis.

The suspected incompleteness and spottiness of required reporting of occupational diseases is substantiated by these figures. Since all 13 companies are engaged in the manufacture of transportation equipment, it would reasonably be expected that more or less the same types of occupational hazards would prevail, giving rise to similar types of occupational illnesses. Even if it were assumed that all operations were ade-

quately controlled, dermatitis, hernia, and tenosynovitis would probably occur fairly universally among these industries. With respect to pneumoconiosis, however, the situation may be different since it is not known how many of the cases might have been reported by physicians in the plant and how many were picked up through mass X-ray surveys.

Incidence of Occupational Diseases

To obtain a more comprehensive picture of the nationwide occupational disease problem, the pilot study data for the 11 States covering the year 1951 only were supplemented by information from the annual reports of workmen's compensation commissions in 17 States not included in the pilot study. It was determined that in the 28 States there were 43,307 alleged or suspected occupational diseases reported in a 12-month period.

State differences in compiling statistics on occupational diseases made the summarization of this material difficult, and certain liberties had to be taken when classifying cases according to a diagnostic pattern. However, a rough classification according to diagnosis shows that diseases of the skin accounted for 54.3 percent of all occupational diseases. Systemic effects due to chemical agents accounted for 5.2 percent; dust diseases of the lungs, 4.6 percent; other respiratory disorders, 1.5 percent; disorders due to physical conditions, 9.5 percent; infective diseases, 2.7 percent; and miscellaneous conditions, 22.2 percent. Wide differences occurred in the number and kind of diseases reported from State to State, probably due in part to prevalence but in larger part to variations in legal provisions on compensation of occupational diseases and to technicalities in processing the data.

Conclusion

On the basis of the evidence presented, required reporting by physicians gives little promise of yielding national statistics on occupational diseases. In view of the long experience with required notification of occupational diseases, and the continuous inadequacy of resultant reports, the need is indicated for a

reevaluation of the principle as well as procedures of required medical reporting. On the other hand, reporting for compensation purposes offers some hope of obtaining general statistics on occupational diseases, provided that some of the obvious technical difficulties can be resolved.

A practical approach might be to suggest standards and procedures, similar to those developed by the American Standards Association on work injuries applicable to occupational diseases, which the workmen's compensation agencies and others could use as a guide and which would make more usable existing statistics on occupational diseases.

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Report of a Case Of Rat-Bite Fever Due to *S. moniliformis*

By ROBERT L. GRIFFITH, M.D., and
DONALD W. McNAUGHTON, M.D.

REPORTS of only 51 bacteriologically proved cases of rat-bite fever caused by *Streptobacillus moniliformis* can be found in the United States through 1951.

Yet with our ever-present rat population, this disease must be considered in the differential diagnosis of obscure febrile illnesses as well as in illnesses following a rat bite. A history of the actual rat bite cannot always be obtained. The disease may be transmitted by any rodent and also by dogs and cats. Laboratory rats, as well as wild rodents, may harbor the organism. Most of the cases have occurred in children or in men whose occupations take them into rat-infested areas. There is also the possibility of the disease being spread by food, as in the 1926 milkborne epidemic in Haverhill, Mass. This epidemic was called Haverhill fever (epidemic arthritic erythema).

The case of rat-bite fever reported here occurred in 1952 in an 8-year-old Seattle boy who was bitten on the tongue by his pet white rat. The disease has previously been reported as being acquired from white rats by laboratory workers. It is the first known case reported from the State of Washington.

It is generally considered that rat-bite fever can be caused by two distinct organisms: *Streptobacillus moniliformis*, a normal inhabitant of the nasopharynx of rats, and the spirochete, *Spirillum minus* (the disease having been originally described in Japan and called sodoku) which is present in infected eyes of rats. Both organisms may be present in the same case.

Dr. Griffith is chief of medical services and Dr. McNaughton is clinical director of the United States Public Health Service Hospital at Seattle, Wash.

Occurrence of the Disease

Watkins (1) in a complete review of the disease in 1946 found a total of 184 cases of rat-bite fever reported in the United States. Of these, 39 cases were proved to be caused by *S. moniliformis* and 41 cases, by *S. minus*. Since 1946 two cases due to *S. moniliformis* have been reported from Massachusetts and one each from Connecticut, California, Delaware, Illinois, Maryland, Michigan, Minnesota, New York, Texas, and Wisconsin.

Until 1951 no proved cases caused by *S. moniliformis* had been reported in the United States west of Minnesota and Missouri, and no clinically diagnosed case had been reported in Canada west of Montreal. In that year, one case was reported from Los Angeles and two cases from Vancouver, British Columbia (2).

This geographic distribution is, no doubt, a matter of recognition and reporting, since there is no reason to believe this worldwide disease is new to western North America. Cases of rat-bite fever caused by *S. minus* have been reported from California and Oregon.

In describing the disease, it is desirable to specify the organism involved and whether it was caused by a rat bite or by some other means of entry into the body.

Diagnosis and Treatment

Clinically, rat-bite fever due to *S. moniliformis* is characterized by septic or relapsing fever and frequently by petechial or morbilliform rash and polyarthritides. The incubation period varies from 1 to 22 days, usually less than 10 days. The primary wound generally heals rapidly. There may be regional lymphadenopathy. Leukocytosis is usually present. About 16 percent of the cases have a false positive serologic test for syphilis. The diagnosis is confirmed by culture on special media and by animal or chick embryo inoculation of blood, joint fluid, or abscess material. Specific agglutination tests may be obtained in a few laboratories where the antigen is available. The titer usually reaches a peak between 1 and 3 months and may persist for 2 years. Specific skin tests may be positive for 4 to 5 months after the infection. Six deaths have

been reported due to this organism in the United States. The most significant findings at autopsy have been myocarditis, endocarditis, and pneumonia.

The disease caused by *S. minus* is remarkably similar clinically to that caused by *S. moniliformis*. The fever is more likely to be relapsing. The local ulcer tends to be more indurated. Arthritis is less common. Approximately 51 percent have false positive serologic tests for syphilis. *S. minus* may be recognized by darkfield examination or by animal inoculation.

Either penicillin or streptomycin is usually effective in the treatment of rat-bite fever caused by either of the organisms. However, one case due to *S. moniliformis* has been reported which responded to streptomycin after failing to respond to penicillin, and another case caused by the same organism was reported which was refractory to both of these antibiotics. It is advisable to perform antibiotic sensitivity tests on the organisms.

CASE REPORT

K. S., an 8-year-old white boy, was admitted to the United States Public Health Service Hospital, Seattle, April 28, 1952, with chills, fever, headache, and vomiting of 6 hours' duration. Four days prior to admission, the child had been bitten on the tongue by his pet white rat. Other members of the family were in good health.

On physical examination his temperature was 103° F., his pulse was 96 per minute, respirations were 22 per minute, and blood pressure was 110 mm. Hg systolic and 70 mm. Hg diastolic. He did not appear to be in acute distress. There were small petechiae around the mouth. There was a small ulcer on the left side of the tip of the tongue with a small area of induration around the ulcer and on the inferior surface of the tongue. The pharynx was moderately injected. Rhonchi were present in the right lower chest. A systolic apical murmur was heard on expiration only. The murmur had the quality of a functional murmur. Physical examination was otherwise normal.

The roentgenogram of the chest at admission was negative. The day following admission the leukocyte count was 17,000 per cu. mm. with

72 percent neutrophils, 25 percent lymphocytes, 2 percent monocytes, and 1 percent basophils. The erythrocyte count was 5,400,000 per cu. mm. The hemoglobin was 14 gm. The platelet count was 83,000 per cu. mm. The hematocrit was 38 percent. The erythrocyte sedimentation rate and the urinalysis were normal. The standard Kahn test was negative. A blood culture was taken on April 29 and a sample was sent to the Seattle-King County Department of Health Laboratory, together with the history of the rat bite. This laboratory recovered the *Streptobacillus moniliformis* by culture on standard tryptose phosphate broth enriched with 20 percent ascitic fluid. After 5 days of incubation the typical fluffy ball colonies were present in the broth, and smears showed the characteristic pleomorphic organisms with filaments and beads. The organism was inoculated into four mice, all of which died, and the same organisms were recovered from them. The laboratory has been able to maintain the strain on Löffler's medium until this date. No pleuropneumonia-like (L_1) organisms were seen.

On April 29 the child was started on 300,000 units of procaine penicillin intramuscularly daily for 4 days. The temperature, which ranged between 102° and 104° F. on the first day, dropped to 101° F. on April 29. The following day the temperature was normal and remained so. After the first day the child slept well and had no complaints. The petechial rash around the mouth faded and the ulcer on the tongue began to heal rapidly.

The child was discharged from the hospital May 2, 1952. Since then he has been well. It was ascertained that the rat had been obtained from a pet shop in Seattle. The family gave the rat responsible for the illness to the Seattle-King County Laboratory where it was autopsied, but no organisms were obtained from the examinations.

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Sanitary Quality of Crushed and Cubed Ice As Dispensed to the Consumer

By V. D. FOLTZ, M.S.

INFORMATION on the sanitary quality of ice as it is served in iced drinks and used to chill foods in public eating places apparently is unavailable in the literature. There are references in the literature of the early nineteen hundreds to studies made on "natural" ice harvested in the winter season and stored for summer use, but these reports are conflicting as to the quality of the ice. At that time it was common belief that natural freezing would destroy any disease germs that might have been present in the original water.

At the present time most of the ice used for chilling food and drink for human consumption is commercially frozen. With the introduction of the use of high-quality water in producing ice, it was generally assumed that the ice would be of the same high quality. This assumption was questioned, however, as early as 1905. A study of a typhoid epidemic in the District of Columbia in that year necessitated the examination of both the "natural" and artificial ice sold in the area, and sanitary surveys revealed that the sanitary conditions in commercial ice plants left much to be desired (1).

In recent years sanitarians have formulated standards of quality for commercial ice and have introduced regulations covering such items as (a) the water supply used, (b) the

plumbing and toilet facilities of the premises and surrounding area, and (c) the employees' health. If such regulations are adhered to, the ice (usually in 300-pound cakes) should be of high sanitary quality when pulled from the freezing tanks. As evidence that the cake ice in the area covered by the studies described in this report is of high quality, the following data are submitted. Ten samples of cake ice, representing at least five ice plants, were purchased, handled with the same aseptic precautions, and cultured in the same manner for coliform, clostridia, and standard plate count as subsequently described for crushed and cubed ice. No coliform or clostridia organisms were detected in any samples, and the average standard plate count for the 10 samples was only 6.8 per 1 ml. of water.

In a previous report attention was called to the gross inert material and high coliform, anaerobic, and total plate count of a limited number of crushed-ice samples (2). This paper reports more detailed studies of the sanitary quality of both crushed and cubed ice as it is dispensed to the consumer.

Test Methods

Standard Methods for the Examination of Water and Sewage (ninth edition) was followed in detail for all procedures relative to plate counts and tests for the presence of members of the coliform group.

The "stormy fermentation" test for the *Clostridium welchii* (*Clostridium perfringens*) group was made by inoculating sterile skim milk in test tubes covered with a paraffin-vase-

Mr. Foltz, professor and acting head, department of bacteriology, Kansas State College, and bacteriologist in charge, Kansas Agricultural Experiment Station, gave this paper before the American Public Health Association, October 21, 1952, at Cleveland, Ohio.

line seal, with 5 portions each of 10.0, 1.0, and 0.1 ml. of water, heating the tubes at 80° C. for 15 minutes, immediately chilling, and then incubating them at 35° C. for 5 days. No tube was called positive unless the seal was blown from the tube and the curd gave a typical "stormy" type of appearance.

Isolation of the dominant type of coliform was made from eosin-methylene blue agar plates streaked from the smallest inoculum giving a positive or a doubtful presumptive test. Identification was carried only to the point of determining the methyl red and Voges-Proskauer reactions on each isolate. Further studies on a limited number of samples were made by adding 50.0-ml. quantities of melted ice to 50.0 ml. of double strength selenite F enrichment medium. This mixture was incubated at 35° C. for 24 hours and subcultured onto bismuth sulfite and S S agar. Colonies suspected of being noncoliform enteric types were isolated and subjected to differential study, as outlined in Diagnostic Procedures and Reagents (third edition).

To detect the presence of and to identify micrococci and streptococci, incubation of 5 portions each of 10.0, 1.0, and 0.1 ml. of water in the enrichment medium designed by Ritter and Treece (3) for the isolation of cocci from swimming pool water was the first step. When growth appeared, all tubes were subcultured on 5.0 percent sheep blood agar. No tube was regarded as negative until 10 days' incubation at 35° C. revealed no growth.

From the blood agar plates incubated at 35° C. for 48 hours, colonies suspected of being micrococci and streptococci were isolated for further study and identification. Those colonies proving to be streptococci were grouped according to the methods outlined by Sherman (4). Micrococci were identified according to Bergey's Manual (sixth edition), and the identification was substantiated with additional tests.

Physical examination of ice samples was limited to the passage of 300 ml. of water through cotton sediment disks with an exposed surface of 0.68 sq. in. A comparison of the amount of sediment collected was made with standard sediment disk photographs, as described in Standard Methods for the Examination of Dairy Products (ninth edition). Sedi-

ment identification was made by wide-field binocular microscope examination.

Residual chlorine was determined colorimetrically by the orthotolidine method, using a Hellige comparator.

Field Procedure

Samples of ice were collected from hotels, restaurants, soda fountains, hospitals, and soft-drink parlors in sterile wide-mouthed jars. The filled jars were sealed immediately with a lid lined with sterile cellophane to prevent the possibility of lacquer from the jar lid flaking and confusing the sediment picture. Bagged ice was purchased and aseptically transferred to the same type of container. All samples reached the laboratory only partially melted. They were tempered at 40° C. until the ice melted and then immediately examined.

The ice samples were collected from establishments in central Kansas within an area having a radius of 150 miles. They included 77 samples of crushed ice and 37 samples of ice from automatic ice-cube machines. Ten of the ice-cube samples came from hospitals. It was thought that this latter group of samples would represent the ideal in sanitary machine care and ice-dispensing techniques. Collections of samples were made either in June, July, or August, or in December or January so that a comparison of the sanitary quality of ice during the two climatic extremes could be made.

Numbers of Bacteria

In table 1 are presented the data on the numbers of bacteria found in the 114 samples of ice included in this study. Only 27 (about 23 percent) of the 114 were free from coliform contamination and would be of acceptable quality on the basis of drinking water standards.

The 84 samples collected during June, July, and August contained the highest average MPN (most probable number) of both coliform and anaerobic bacteria and the second highest average standard plate count of the 6 groups of samples. The winter samples had a comparatively low average coliform count, indicating a decidedly better quality of ice than

Table 1. Numbers of bacteria found in 114 samples of crushed and cubed ice

Range of MPN coliform per 100 ml.	Number samples	Average MPN coliform per 100 ml.	Average MPN clostridia per 100 ml.	Average standard plate count per 1.0 ml.
All samples (114):				
0-----	27	0	1.4	1,330
2-23-----	24	8	9.5	26,300
24-920-----	32	235	48.4	5,200
1,600->1,600-----	31	>1,600	46.8	58,400
Average-----	---	506	28.6	23,000
Summer samples (84):				
0-----	14	0	14	1,770
2-23-----	14	9	5.9	43,600
24-920-----	27	219	56.8	5,900
1,600->1,600-----	29	>1,600	42.2	51,900
Average-----	---	624	36.3	27,400
Winter samples (30):				
0-----	13	0	2.7	852
2-23-----	10	6	44.1	1,983
24-920-----	5	322	3.1	1,370
1,600->1,600-----	2	>1,600	9.5	152,350
Average-----	---	162	17	11,415
Commercial crushed ice (77):				
0-----	10	0	36	1,028
2-23-----	18	7.4	13	34,997
24-920-----	23	267	67	6,508
1,600->1,600-----	26	>1,600	499	69,266
Average-----	---	615	32	33,600
Ice-cube machine ice (37):				
0-----	17	0	.11	1,509
2-23-----	6	10	.33	212
24-920-----	9	56	0	1,874
1,600->1,600-----	5	>1,600	0	1,795
Average-----	---	255	.11	1,561
Hospital samples (10):				
0-----	10	0	0	1,029
2-23-----	0	0	0	0
24-920-----	0	0	0	0
1,600->1,600-----	0	0	0	0
Average-----	---	0	0	1,029

the summer samples. However, the coliform count coupled with an average MPN of 17 clostridia per 100 ml. of water and a standard plate count of 11,415 bacteria per 1 ml. indicates a poor quality product on the basis of the standards for acceptable drinking water.

Only 10 (13 percent) of the 77 samples of commercial crushed ice were found to be free of coliform bacteria, whereas 17 (46 percent) of the 37 samples of cubed ice were free of coliform organisms. All 10 of the hospital samples were free of both coliform and clostridia organisms.

Types of Organisms

The dominant coliform types isolated from the 87 samples giving positive and doubtful presumptive tests were *Escherichia coli* from 41 samples and *Aerobacter aerogenes* from 46. In some samples only one type of the coliform group appeared to be present; but in the majority of the samples a mixture was observed.

From the limited number of samples subjected to selenite F enrichment and subsequent streaking on S S and bismuth sulfite agar, a number of isolations were made from entericlike colonies. Examination of these cultures yielded organisms identified as *Proteus* spp. and *Paracolobactrum* spp.

Pseudomonas spp. were found in 25 of the 114 samples studied; *Pseudomonas aeruginosa* was isolated most frequently, followed by *Pseudomonas fragi*.

Thirty-two of the 37 machine ice-cube samples were cultured in sodium azide enrichment broth to make possible the isolation and subsequent identification of micrococci and streptococci. The results are recorded in table 2 in such a manner as to make possible a comparison between growth in azide broth and the isolation of coliform types. The frequency of micrococci and streptococci isolations from coliform-positive and coliform-negative samples is also shown.

Growth developed in sodium azide medium in 24 (75 percent) of the 32 samples cultured in this medium. From these azide-growth-positive samples coliform types were isolated from 16, streptococci from 19, and micrococci from 22. It is significant that coliform types were found in only 1 of the 8 azide-negative samples. Seventeen of the coliform-positive samples were found to contain streptococci and/or micrococci—streptococci in 14 and micrococci in 16. In contrast the 15 coliform-negative samples yielded only 6 streptococci and

Table 2. Number of samples from which isolations of micrococci, streptococci, and coliform organisms were made, and correlation of findings: 32 samples of cubed ice examined

	Azide broth		Coliform isolation	
	Growth	No growth	Positive	Negative
Micrococci isolated.....	22	-----	16	7
Micrococci not isolated.....	2	-----	1	8
Streptococci isolated.....	19	-----	14	6
Streptococci not isolated.....	5	-----	3	9
Coliform present.....	16	1	17	15
Coliform not present.....	8	7	-----	-----
Growth in azide broth.....	24	-----	16	8
No growth in azide broth.....	-----	8	1	7

7 micrococci isolations. One hundred and eighty-four cultures of micrococci were isolated from the 24 growth-positive-azide samples. A brief study of the micrococci revealed that 97 were hemolytic, and 87 nonhemolytic; 11 (5 percent) were coagulase positive, and 173 coagulase negative; and 63 produced yellow, 14 orange, and 107 white pigment. The organisms were identified as belonging to the following species: *Micrococcus pyogenes* var. *aureus* and var. *albus*; *Micrococcus citreus*; *Micrococcus flavus*; *Micrococcus epidermidis*; *Micrococcus candidus*; *Sarcina flava*; *Sarcina aurantiaca*; *Sarcina lutea*.

Ninety-eight streptococci cultures were isolated from the 24 azide-positive samples. Of these cultures 87 were found to belong to the enterococcus group, 10 to the lactic group, and 1 to the viridans group. A large percentage of the cultures grouped as enterococci grew at 10° C. and at 45° C. and in the presence of 6.5 percent sodium chloride, indicating that they were probably *Streptococcus fecalis*.

The MPN of micrococci ranged from 2 to more than 1,600 per 100 ml. of water, and the streptococci, from 4.5 to more than 1,600. The micrococci gave higher MPN values than the streptococci.

Sediment

Sediment collected by filtration and examined under the wide-field binocular microscope

was found to contain sand, clay, assorted colored fibers, assorted colored threads, vegetable fibers, finger-nail-polish scales, insect fragments, rodent hairs, and wood splinters. The amount of sediment removed by the filtration of 300 ml. of water ranged from 10.5 mg. to 0.25 mg., averaging 2.25 mg. The ice-cube samples contained the least amount of extraneous material, and the group of summer samples contained the largest amount of sediment. Available residual chlorine was consistently low or entirely absent; the largest amount in any sample was 0.01 ppm.

Discussion

The finding of only 13 percent of the crushed-ice samples to be of satisfactory sanitary quality when judged by the standards used for public water supplies indicates that most of the crushed ice in the area covered by this survey is of extremely poor quality. In general, the same conclusion applies to automatically frozen cubed ice dispensed in commercial establishments.

The frequent isolation of *E. coli*, universally accepted in water analysis as an indicator of pollution of human or animal origin, suggested the desirability of testing for other types of organisms of possible sanitary significance. The subsequent tests for clostridia, enteric bacilli, micrococci, and streptococci revealed that one or more of these four groups of bacteria, which are intimately associated with the human body, were found in the majority of ice samples. Frequently the numbers were large enough to suggest recent heavy pollution of possible human origin.

The organisms found are of sanitary significance not only because ice is introduced directly into beverages, but also because it is used in direct contact with foods, some of which are eaten raw, to accomplish chilling. Micrococci, streptococci, coliform types, paracolon organisms (5), and *Proteus* (6) all have been identified as or suspected of being the causative agent in food poisoning. *Pseudomonas* spp., which were detected in 22 percent of all ice samples examined, are known to play an important role in the spoilage of certain foods (7). Thus, crushed ice in direct contact with

food may serve as a source of contamination with both food-spoilage and food-poisoning organisms.

Origin of Microorganisms

The question naturally arises as to the origin of the large numbers of bacteria found in ice when it reaches the consumer. Time has not permitted a thorough investigation of this phase of the problem, but some information is available.

Ice is usually manufactured from a water supply which is tested regularly and maintained at an acceptable sanitary level. Furthermore, cake ice as taken from the freezing tank was found to be entirely satisfactory, whereas crushed ice from the same plant was found to be highly contaminated. Finally, the temperature within a mass of crushed ice and the limited time interval between crushing and consumption would, for practical purposes, eliminate growth of all the organisms tested for in this investigation. Thus, it would seem reasonably certain that most of the microorganisms found in crushed ice when it reaches the consumer have gained entrance at one or more points between the freezer and the consumer.

No effort was made in this study to evaluate the relative significance of factors which may contribute to the contamination of crushed ice. Even a casual examination of the average ice plant and other facilities for handling ice, however, will indicate many possible points of contamination: the ice plant itself; the sawing, crushing, and grinding equipment; the containers in which the ice is transported; the loading and unloading docks; the delivery trucks and insulating blankets; and the dispensing facilities. Factors to be considered are the construction of the ice plant, the maintenance of the equipment, the protection afforded the ice after it leaves the freezing tank, and the practices used in handling the ice.

Although the bacterial content of cake ice was found to be practically nil, the producer is not relieved of all responsibility for the quality of the crushed ice delivered to the consumer. A rapidly expanding practice in the handling of ice is for the producer to deliver crushed ice to the dispenser. The ice may actually be packaged in bags which the retailer dispenses

intact. Several samples of bagged crushed ice were included in this study, and no significant difference in quality was noted between this ice and the crushed ice collected from the individual dispensers.

The fact that ice from automatic freezers in hospitals was found to be of high sanitary quality whereas most of that from machines in retail establishments was found to be of poor quality indicates an absence of sanitary precautions in machine care and in dispensing techniques in the latter. The feasibility of producing high-quality ice with the automatic ice-cube machine is demonstrated by the finding of all hospital samples free of coliform and clostridia organisms.

Corrective Measures

Despite the fact that ice is by its very nature one of the products most amenable to sanitary production and handling, the data presented here leaves no question as to the poor sanitary quality of much of the ice dispensed to the consumer in the area covered by this survey. What are the reasons for this apparently paradoxical situation? Primarily, it is due to the absence of factual information concerning the quality of consumer ice; secondarily, to the lack of appreciation, on the part of producers and handlers, of the factors influencing the sanitary quality of ice. It is hoped that the facts presented here will stimulate such additional research as is necessary to evaluate the relative significance of the many factors contributing to the poor quality of crushed and cubed ice. Only with such information will it be possible for public health authorities to formulate adequate regulations concerning production and handling of this product.

In the meantime, any well-trained sanitarian can initiate an educational program in his community, a program which will acquaint the public with the need for a better product and provide the producer and handler with the necessary information to meet a demand for high-quality ice.

Summary

Data are submitted which show that the majority of crushed and cubed ice at the consumer level is of extremely poor sanitary quality.

Evidence is presented indicating that initially ice from both commercial and automatic freezers is of acceptable quality. The high plate counts, the presence of significant numbers of *Escherichia coli*, clostridia, micrococci, and streptococci, and the quantities and types of inanimate material present in crushed and cubed ice suggest recent, heavy contamination, at least a portion of which is of human origin. The implications associated with the extensive consumption of such a product are obvious, and the problem deserves early attention by public health authorities.

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Public Health Service Staff Announcements

Dr. James R. Shaw has been assigned as chief of the Branch of Health of the Bureau of Indian Affairs where he will supervise the administration of 59 Indian Service hospitals and the public health program of the Bureau. He has been chief of the Division of Hospitals, Public Health Service, the past year. Previously, he was medical officer in charge of the Public Health Service Hospital in Detroit. Dr. Shaw has also held medical staff positions in the Public Health Service Hospital in San Francisco and its clinics in Los Angeles and San Pedro, and has served as district medical officer of the Coast Guard at Long Beach, Calif. He was admitted to the commissioned corps of the Public Health Service in 1939.

Dr. Clifton K. Himmelsbach has been appointed assistant chief of the Division of Hospitals, Public Health Service, as successor to **Dr. Myron D. Miller**, recently assigned medical officer in charge of the Public Health Service Hospital in Seattle. For the past 5 years, Dr. Himmelsbach has been medical officer in charge

of the Washington, D. C., Outpatient Clinic of the Public Health Service. He has held medical staff positions in several Public Health Service hospitals, and in the Service's hospital in Lexington, Ky., he directed clinical investigations on narcotic drugs and addiction. Before coming to Washington in 1947 as chief of the medical operations branch of the Federal Employee Health Program, he was a medical consultant for the Office of Vocational Rehabilitation.

Dr. Stanley E. Krumbiegel has been appointed medical officer in charge of the Public Health Service Outpatient Clinic at Washington, D. C., to succeed Dr. Himmelsbach. Dr. Krumbiegel has been medical director of the Bureau of Prisons, Department of Justice, since 1948. Since receiving his commission in the Public Health Service in 1939, he has served as medical staff officer in Public Health Service hospitals in Boston and on Ellis Island, and as staff psychiatrist and chief medical officer in a number of Federal penal and correctional institutions.

State Laws on Financing and Staffing Local Health Departments

By CLIFFORD H. GREVE, M.S.P.H., and KATHRYN J. CONNOR

This report completes a three-part presentation in Public Health Reports of a study of State laws, regulations, and practices applicable to local health departments, made by the Division of State Grants of the Public Health Service.

The first section, entitled "Provisions of State Laws Governing Local Health Departments" (January 1953, pp. 31-42), described existing laws, regulations, and accepted practices with respect to boards of health, health officers, and the organization of local health departments.

The second section is entitled "General Regulatory Powers and Duties of State and Local Health Authorities" (April 1953, pp. 434-438).

A separate 68-page report entitled "State Laws

Governing Local Health Departments" (PHS Publication No. 299) presents in tabular form data by individual States on all aspects of the study.

Thus, a comprehensive report of public health legislation is available as reference material to guide States in planning legislative programs in this field.

The data summarized in these reports are from questionnaires prepared by regional office personnel of the Public Health Service assisted by regional attorneys of the Department of Health, Education, and Welfare. Information relating to procedures carried out by practice in the absence of statute or regulation was collected in personal interviews with State health officers or members of their staffs.

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STATES have fewer laws, regulations, and practices pertaining to the financing and staffing of local health departments than they have for governing the appointment and qualifications of local health officers, the establishment of local health units, or the delegation of broad regulatory powers and duties to State and local health authorities.

Distribution of Costs

In all States, local units of government are

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permitted to raise local revenues to finance all or part of the cost of local health departments. However, specific or general limitations are frequently placed on this general power either by statute, regulation, or by practice without statutory authority. Some of the limitations may be applicable only to some types of local governmental areas or only under certain conditions.

About two-thirds of the States prescribe methods for allocating the cost of operating local health departments among participating local units of government. Such allocation may involve distribution of costs among counties in district health units, or between county and city in city-county units, or among townships in single-county units. Specific methods for the proportionate distribution of costs

Table 1. Number of States providing for local financial support of health units by statute or practice

Type of provision	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Practice	Statute	Practice	Statute	Practice
Prescribed local percentage of cost ² -----	4	6	1	4	3	2
Specific millage limitation on taxation-----	21	-----	13	-----	8	-----
Special health tax beyond other limitations-----	23	-----	18	-----	5	-----
Mandatory tax rate or millage-----	4	-----	2	-----	2	-----
Per capita local appropriation-----	2	2	2	1	-----	1
Minimum dollar amount-----	1	3	-----	3	1	-----
Other provisions-----	26	2	3	1	23	1

¹ Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.

² Authorized by regulation in 1 State.

among local governmental units are established by statute in 26 States, but in 6 of these the method of allocation is applicable only to district health units, and in one other State only to cities and districts. In describing the method of apportionment of funds from local resources among local units of government, States most frequently report the use of a population factor.

Local Financing

Several types of provisions are used by the States to determine the share of total local health department costs which are to be met from local revenues. Eleven States require that a prescribed percentage of the cost of operating each local health department be met from local revenues (table 1).

Local financing of health departments is frequently influenced by statutory tax provisions. Local taxation is based primarily upon real estate valuations. Tax limit provisions in 21 States establish by law a specific millage limitation applicable either to specific taxes for public health purposes or to taxes in general. In either case such provisions place a limit upon local revenues available for public health purposes. Twenty-three States have statutes which permit levy of a specific health tax in excess of other tax millage limitations. In only 4 States does the law require the imposition of a mandatory tax rate or millage for the financing of local public health programs.

Four States require a local per capita appro-

priation as the share to be borne by local revenues. In 4 States a minimum dollar amount is required of local governments in financial support of the local health department.

Twenty-eight States report other provisions that are applicable to the financial support of local health departments. These are generally contained in statutes but are usually limited in their application. Frequently, a State may have more than one provision applicable to the local financing of health departments.

Nineteen State health officers indicated that local health departments should be supported from the general tax fund, while 21 State health officers thought local financial support should come from special tax provisions. At least 7 health officers thought local financial support should come from both sources.

State Financing

Inadequate local revenue from tax resources requires local health units to depend in part upon State funds and other resources for assistance in financing their health programs. Nearly three-fourths of the States have statutes which authorize the distribution of State funds to local health units (table 2).

Methods used to distribute State funds are important in the sharing of State revenue with local units of government. These methods usually fall into two groups: those designed to allocate available funds by some objective method, and those based on subjective judgment. Objective formulas vary widely between

States but, in general, are designed to provide a State-local fiscal relationship which offers security to local health programs. Comments made by State health officers indicate that most of them think it desirable to establish a relationship between local and State funds for allocating the cost of local health units.

One type of objective formula used by one-fourth of the States provides that a percentage of total operating costs of local health units be met from State funds. By a second method of distribution closely related to that of paying a percentage of the total cost, the State pays a percentage of the salaries of all or certain selected employees of local health departments.

Other types of objective formulas are used by 17 States in the distribution of State funds. There was wide variation in the objective methods described, but the use of factors of population and financial need was reported most frequently. Basic grants to each local area, or grants based upon specific health needs, are not uncommon factors employed. As an adjunct to the distribution of State funds, contracts are frequently drawn between State and local officials to legalize the financial agreement made either through the use of subjective judgment or an objective formula.

Payment Procedures

The designation of an official custodian of local health funds is accomplished by law in

33 States, in 8 additional States by common practice, and in 1 State by regulation. Almost universally, the person designated as official custodian of the local health unit funds also disburses the funds. In districts, the treasurer located in the most populous county or in the county housing the headquarters of the local health department is generally the disbursing officer for multicounty units.

The payment of State funds to local health units is made on a reimbursable basis in only 20 States. Six of these States have statutes providing for a reimbursable payment procedure; 13 States do so by practice, and 1 State by regulation.

Actually, the reimbursable principle is frequently achieved by issuing State checks to cover salaries of local health department employees. Thirteen States report that they issue checks against local funds covering salaries of local health department employees, but in only 3 States is this done on the basis of a statutory provision.

Twenty-six States issue State checks to pay the salaries of local health department employees who are paid from State and Federal funds. In conjunction with this procedure, the use of State or Federal funds in local health department budgets is frequently limited to salary items. In 1 State it applies only to the salaries of nurses employed in local health units. In only 13 of the States which pay local employees with State checks does the check indi-

Table 2. Number of States providing for the authorization and distribution of State funds to finance local health units by statute or practice

Type of provision	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Practice	Statute	Practice	Statute	Practice
Authorization for distribution of State funds ²	35	4	32	2	3	2
Objective methods for distribution of State funds:						
Percent of total cost ²	6	5	5	4	1	1
Percent of salaries	3	4	2	4	1	
Other objective formulas ²	5	11	5	11		

¹ Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.

² Authorized by regulation in 1 State.

Table 3. Number of States with statutes or practices designating authority for the preparation and approval of local health budgets

Authority ¹	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ²	
	Statute	Practice	Statute	Practice	Statute	Practice
<i>Budget preparation</i>						
In single governmental areas:						
State health department.....	2	12	-----	9	2	3
Local health officer.....	5	34	4	29	1	5
Local board of health.....	11	4	10	2	1	2
In districts:						
State health officer.....	1	9	1	9	-----	-----
District health officer.....	-----	14	-----	14	-----	-----
District board of health.....	13	6	13	2	-----	4
<i>Budget approval</i>						
In single governmental areas:						
State health officer ³	8	20	7	16	1	4
Local board of health ⁴	5	17	3	16	2	1
Local legislative body.....	18	15	15	11	3	4
Local administrative official.....	3	9	2	4	1	5
In districts:						
State health officer ³	5	23	5	20	-----	3
District board of health ⁴	3	12	3	12	-----	-----
Local legislative body.....	10	11	8	11	2	-----

¹ Budgets are usually prepared and approved by more than one authority.

² Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.

³ Authorized by regulation in 2 States.

⁴ Authorized by regulation in 1 State.

cate the source of funds from which the employee is being paid.

Ten States require that local funds for the support of local health units be deposited in State treasuries for disbursement. Three States require local funds to be deposited locally for disbursement by a State health department official or other State disbursing officer.

State funds are paid to local custodians of funds for disbursement in 21 States. Only 8 States have statutes establishing this procedure, and in 1 State new enabling legislation sets up the procedure. The payment of State funds to local custodians is specifically prohibited by law in 2 States.

Budgets and Plans

The responsibility for the preparation of local health department budgets is delegated to a wide variety of officials, and such delegation is more frequently based on practice than on

statutory provision. In 14 States, local health department budgets for single governmental units such as cities or counties are prepared by the State health department. Local health officers serving this type of unit have some responsibility for the preparation of budgets in 39 States (table 3).

In 10 States district health department budgets are prepared by the State health officers although only 1 State has statutory provisions prescribing this procedure. District health officers prepare their budgets in 14 States, while district boards of health prepare the budgets in 19 States.

After budgets of local health departments have been prepared, there is usually some procedure established for their approval. Provisions for budgetary approval are more frequently established by practice than by statute and may involve more than a single official or agency. The State health officer is responsible for approving local health department budgets in 30 States, and he also has authority in 30

States to approve district health department budgets.

As indicated in table 3, the local board of health is responsible for approving budgets for single governmental units in about half the States. In 33 States the local legislative body has some responsibility for approving budgets. Local administrative officials have responsibility for the approval of budgets in 12 States.

In district health units the budgets are usually approved by the State health officer, but district boards of health have powers of budget approval in 15 States. Local legislative bodies in districts may approve budgets in 21 States.

Almost universally, State health officers commented that local health officers should prepare the budgets with some other local or State authority, or both, having power of approval.

A relatively new procedure of plan preparation requires local authorities to outline their health programs in advance. Less than half of the States have provisions for the preparation of plans either through statutory requirements or in practice. Seventeen States indicated that plans for single governmental health units are prepared in practice.

Twelve States require plans from district health units in practice, while 5 other States have statutory requirements with respect to plans for these units.

The majority of States which require plans from local health units also require that more than one authority approve each plan, and this approval is usually based on practice rather than on regulation or statute. The State health officer is the authority most frequently assigned this responsibility, but in only about a third of the States requiring his approval is it based upon statute.

Staffing Local Health Departments

Staff appointments in local health units usually are made by the local health officer or the local board of health. Frequently, there is joint approval by the local health officer and local board of health in making such appointments. The law in some States requires that certain officials, such as the city and county commissioners, or the State health department be consulted with respect to staff appointments. Thirty-seven States have provisions permitting the local health officer to make staff assignments to local units (table 4). In 20 States the local board of health has statutory appointing authority, but in a dozen States these boards are not the sole possessors of this authority. In 4 States the law limits the appointing authority of local boards of health to city health departments. The questionnaires

Table 4. Number of States providing for staff appointments to local and district health units by statute or practice, according to appointing authority

Personnel appointed by	Total States with provisions		States with provisions generally applicable		States with provisions of limited application ¹	
	Statute	Practice	Statute	Practice	Statute	Practice
In single governmental areas:						
Local health officer	19	18	5	13	14	5
Local board of health	20	6	12	3	8	3
State health department ²	2	5	1	3	1	2
Local governmental personnel office	2	1	1		1	1
Others	11	2	8	2	3	
In districts:						
District health officer	20	8	12	7	8	1
District board of health	14	1	7		7	1
State health department ³	1	5	1	3		2
Each constituent unit	3		2		1	
Others	1	1	1	1		

¹ Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.
² Authorized by regulation in 3 States.
³ Authorized by regulation in 2 States.

further reveal that 10 State health departments make staff appointments to local health units.

Predominantly, the responsibility for staff appointments to district health units rests with the district health officer, and in 20 States he has such authority by statute (table 4). The data also indicate that statutes in 14 States provide district boards of health with the responsibility for making staff appointments, but in only 6 States do they perform this duty alone. The State health department appoints personnel to district health units in 8 States. Statutes in 3 States require that appointments to multi-county health units be made by each constituent unit making up a district health department.

In 17 States personnel in district health units serve only the constituent governmental unit to which they are assigned rather than serve throughout the district. This is a statutory requirement in 5 States. Personnel serving in district health units are responsible to the district health officer in 37 States.

Merit System

Personnel of local health departments in the majority of States are employed under some type of merit system. One-third of the States have statutory provisions for a merit system covering local health department employees. Regulations for the establishment of a merit system for local health department personnel exist in 7 States; however, in 2 of these States statutory provisions for this purpose also have been enacted. Several States indicate that a merit system is operated for local areas only if they receive State aid.

In the questionnaires States were requested to specify the type of merit system applicable to their local health department employees. A total of 31 States indicated that the State merit system was extended to cover local employees. In 14 States this was accomplished by statute. In 10 States such a procedure was carried out in practice and in 7 States by regulation. Four States administer a separate merit system for local health unit employees, but these are operated either on the basis of practice or by regulation.

Seven States have statutes providing for a locally administered merit system, but in 6 of

these States such provisions are limited in their application. Nine States provide for locally administered merit systems by practice with more than half of these having limited application. In one State regulations provide for a locally administered merit system of limited application.

There are 11 States in which local health department employees are, either by practice or by regulation, State employees and therefore employed under the merit system applicable to State employees.

Compensation Plans and Retirement Systems

More than two-thirds of the States have statutory provisions for a statewide compensation plan applicable to local health department employees. In addition, all except one of the remaining States have compensation plans established by regulation or by practice. It should be pointed out, however, that only 5 States indicated that the statewide compensation plan provided for differences in various sections of the State.

There is wide variation between States in the authority named to establish compensation plans. By statutory provision in 22 States the local boards of health establish such plans. A few States name the local health officer, the State health officer, or the State board of health as the establishing authority although few reported this as a statutory provision. In one-third of the States the law requires some other authority, such as the State personnel board or city or county commissioners, to establish the compensation plan.

Placing of local health unit employees under a retirement system is authorized by law in 33 States. Not all local health unit personnel in the same States are covered by the same retirement system. The laws in many States provide for an extension of State retirement plans or the purchase of social security benefits, or both. Local health employees infrequently come under a locally administered retirement plan.

Summary

Local governments in all States are permitted to raise revenue from local resources for the

support of local public health services, but insufficient local revenue necessitates the allocation of State funds to carry on local public health programs. In this connection, States frequently distribute their funds by some subjective formula rather than according to an objective formula. This report shows that requirements for financing local health units are most frequently carried out by statutory provisions. On the other hand, the establishment of payment procedures and planning activities, such as the preparation and approval of local health unit plans and budgets, is usually done by accepted practice.

Payment procedures usually provide for the designation of an official custodian of local health funds, and he is usually the person who distributes the money. Although State funds are often paid on a reimbursable basis, few States follow this procedure by law. More than half the States permit the issuance of State checks to pay local employees.

Statutory provisions generally govern the appointments of personnel to local health unit staffs. These appointments are usually made

by one or more authorities but are frequently the responsibility of the local or district health officer and the local or district board of health. The State health departments seldom have the responsibility for assigning local personnel. It is the law in several States that the county or city commissioners, the board of supervisors, or the governing legislative body make local staff appointments.

Although the majority of States report that local health unit personnel are covered by some type of merit system, this coverage rarely is based on statute. Statewide compensation plans, which have been adopted in all but one State, usually are established by local boards of health according to law. The law in two-thirds of the States requires that local health unit employees be placed under a retirement system. Essentially the same number of States report the extension of State retirement plans as report the purchase of social security benefits for local health employees. A few States report the existence of both systems, while some States provide for a locally administered retirement plan.



A Date Book Invitation

RHODE ISLAND. A regular attendance of 75 was attracted to a 1952-53 series of nurses' conferences in Providence by an effective date book device. Since 1950, the bureau of public health nursing in the State health department has worked to develop ways of getting the public health aspects of nursing included in the basic nursing curriculum. The

date book was another step in this direction.

The booklet was prepared by the bureau, and the series was sponsored by the bureau and by the State nursing league. Meetings were free and were held monthly in Providence hospitals.

The booklet was sent to social workers, faculty members of schools of nursing, and others who teach basic nursing students. Titled "We Need Rhode Island's Social and Health Agencies—And They Need Us," it announced that the conferences were designed to acquaint members with the health and social resources available in Providence. For each meeting, the subject, the

time, and the place were listed on a separate page. Small (about 6¼" by 4¼"), inexpensive (mimeographed), the date book also contained title and introduction pages.

Speakers represented such agencies as the State cancer and heart societies, the Providence police, school, and social welfare departments, and the University of Rhode Island. Typical subjects included discussions on community resources for treating drug, alcohol, and mental health problems; on the availability of child welfare services and rehabilitation for the handicapped; on industrial participation in maintaining community health; and on the success achieved by interagency cooperation.

Unfinished Business and New Forces In Environmental Health Orthodoxy

By ABEL WOLMAN, Dr.Eng.

ON EXAMINING the table of contents of a forthcoming volume on public health under the editorship of one of the most distinguished workers in that field, I was astonished to find no mention of environmental sanitation or hygiene. The volume comprehensively covers elements in the public health field which are largely medical, dealing with the newer fields such as hospital care and geriatrics. But the book ignores the environment.

This field has been well defined by Winslow as "environmental therapeutics," the term encompassing those controls of the environment and that machinery of the community which go into the preservation of health and the prevention of disease.

Perhaps it might be useful to probe a bit into some of our current assumptions and practices in light of Winslow's farsighted concept. Also, we might attempt a glance forward.

Orthodox Functions

Begin with a look at what current engineering literature describes as the "orthodox functions" of the sanitary engineer. I want to take issue with this term and to explain why.

Dr. Wolman is professor of sanitary engineering at the Johns Hopkins University. Awarded the Sedgwick Memorial Medal "for distinguished service in public health" in 1948 by the American Public Health Association, of which he was president in 1939, his professional experience has spanned nearly a half-century and his assignments and interests have taken him into a wide variety of fields.

The orthodox functions are so familiar that nobody in a country such as this worries about water supply so long as something that is reasonably liquid and reasonably clear flows out of the spigot. We have become accustomed over a quarter of a century to a status in which that is the expected.

The canvass of the functions of the State, municipal, and county health departments made by the American Public Health Association recently bears out the fact that the so-called orthodox functions—such as water supply, sewerage, refuse disposal, and food sanitation—take a declining portion of sanitary engineering staff time in those agencies.

Yet travel about the country reveals that although those problems are by definition orthodox, they are, in addition, unsolved. They are unsolved technically and unsolved from the more important standpoint of coverage of the population. Many millions of persons living in well-defined communities in this country—the sparsely populated areas not included—have neither a public water supply nor public sewerage facilities. We are confronted with a persisting problem which has been accepted as solved partly because typhoid fever, the earlier measure of the problem, is disappearing.

In appearing yearly before the Maryland Legislature, in my early days, I defended the State health department budget exclusively and simply on the typhoid fever death rate decline. The familiar curve of typhoid fever disappearance was impressive, quantitative, logical, and simple. It was a much happier day than now

Before the regular monthly general staff meeting of the Public Health Service in Washington on May 1, 1953, an internationally known teacher and practitioner of sanitary science informally examined that field of public health endeavor which Dr. Winslow has characterized as "environmental therapeutics." In the following condensation of Dr. Wolman's informal remarks he notes that while many of our currently underemphasized problems are "by definition orthodox, they are in addition, unsolved." In closing, Dr. Wolman remarked that he knew he was speaking dogmatically and that he had "purposely chosen areas of criticism, simply on the assumption that you know what you have done."

when less dramatic and more subtle complexes must be explained in support of a budget.

Typhoid days are gone, and now people ask: "Why should you concern yourself with the extension of water supply? The typhoid fever rate total is quite small throughout most parts of the United States."

The combination of that disappearing index of necessity (or accomplishment) and the fact that we are dealing with orthodox and familiar principles has resulted in an important technologic and administrative gap in the matter of water supply and sewage and refuse disposal.

Progress in Sewage Disposal?

It required nearly a third of a century to eliminate cesspools and septic tanks in a large part of the congested areas of the United States. Today, we find that accomplishment has become negative. In the last 12 years we have put in more septic tanks and cesspools than we took out in the previous 40. We describe that situation as one which "crept up" on us.

Most health officers and sanitary engineers can recall the struggles to eliminate those early devices from the metropolitan areas. Recently a report came from one State of the installation of thousands of septic tanks and derivatives thereof in the past 5 years—perhaps half of them in areas in which the ground water is 8 inches or so below the surface.

The careful distribution of sewage among the population in certain congested areas has been eminently successful! We could not have done it better by design.

Community Management Problems

All of us in public health and public administration have fallen down in two areas of effort. We have failed to develop the administrative and fiscal machinery necessary to provide the public amenities of water supply, sewerage, and sewage disposal in areas outside the political boundaries of individual cities. Efficient planning, with very few exceptions, declines as one moves out of the municipality itself into its metropolitan areas, and in turn from the metropolitan areas into the more rural counties. It virtually disappears on an intercounty basis. Here we encounter the absence of either or both a responsible official agent or a militant public interest and knowledge. The two, of course, are inseparable, whether in city, metropolitan area, or county.

In the city, the problem is lifting the sights: first, of municipal officials, a task made more difficult because of historical limits; and second, of individuals, who do not see that city plans and ordinances do not necessarily whittle away their private rights.

As in epidemics, government takes action when the hazard to the many becomes too great. It has been about 18 years since the zoning ordinance of Baltimore was upheld by our court of appeals on the basis that smoke and carbon dioxide and congestion were true public health hazards. Within the city, however, there is still insufficient integration of planning and programs by the department of public works, the department of health, the department of highways, the city planning commission, the housing

authorities, and the redevelopment commissions. And I know of no city which has been able to accomplish this integration satisfactorily.

Metropolitan and Rural Areas

In the metropolitan area and counties, we are confronted with the problem of ex parte units. As chairman of the Maryland State Planning Commission for 10 years, I called officials together from the various areas frequently but found that a political boundary line on a map is an amazing brick wall.

We are edging into progress in the direction that all would like to see. In many instances, the State sanitary engineer has the opportunity to effect cooperation because he gets around. He has a comprehensive view. His facilities in general transcend political boundaries. He has a potential—one which he has not always used because he is busy with other things and gives integration and cooperative planning a low priority.

Integration ought to have a high priority. Possibly no one would require a sanitary engineer to be also a city planner, but he could be one of the best and sometimes is.

Suburbia Needs Sewers

The tremendous growth in this country in the past decade will probably continue in the next decade, particularly in the metropolitan areas, and generally there is no organization to assure installation of conventional sanitation features. All down the line our official groups for one reason or another have failed to introduce or develop the planning that would have prevented retrogression in this area.

In some of our States, sanitary district operations are almost at a minimum. Even in one of our greatest metropolitan areas in 1950, there were 50,000 septic tanks and cesspools within the city limits. Most were brand new. Most were bad. Many were recently installed in unsuitable soils. They were the result of a city policy which decreed that sanitary sewers would not be constructed unless storm sewers were first installed. It drove those areas into a medieval system of sewage disposal. I fail to see any logic in this.

The absence of workable administrative and planning machinery in and around our cities is one charge against our past practice and one which I hope will stimulate thought and future action.

Fiscal Blind Spots

Medical officers and sanitary engineers in their fields of application have a benign disregard for how the money is found. Their objective is to get the orthodox facilities introduced.

It is astonishing to find in no few instances that, when the pressure for installation of a system begins to mount, there is no realization of the amount of money involved. There appears, sometimes, what seems almost a cavalier disregard of whether the system costs \$10, \$20, or \$30 million.

I do not take exception to that too strongly, because if systems are needed and there are sound public health justifications for them, the money should be found. However, increasing attention should be paid to devices for finding such money—and there are devices.

Research in, and transmission of, information concerning methods of finances are as desirable and necessary as is the purely technologic delineation of the system.

Housing: Gap in the Orthodox

Administration sometimes has taken an easy route which reminds me of King Canute. Since sanitary facilities are not easily available, since the administrative machinery is not easily developed, and since the money does not seem to be in sight, the order goes out that no further construction of housing can take place in a particular area.

We must find some alternative to that negativism.

One of our most distinguished sanitary district engineers has announced that the function of his particular agency is to see to it that houses in subdivisions of 500, 1,000, or more shall not be placed where the agency considers them to be inappropriate on a zoning basis. The agency has no zoning powers, but it can extend water and sewer lines. It simply says, "Out in this

area, we do not think you belong. Therefore, you cannot get our facilities." The courts have yet to speak.

Technologic Challenges

An important technologic challenge confronts us in the orthodox areas. It is reflected partly in what I have said about money.

We are using, in the fields of water supply, sewage and refuse disposal, and in housing, approximately the same structural devices, the same technologic procedures that were employed a half century ago. We have made adjustments, of course. We have a different filter bottom than the one used in 1829 in London. It is not materially different, but it is a little different. We use a type of rake, with very modest modifications, which was used in 1913.

Is the state of our art so far advanced that there can be no contributions, not only to reducing cost, but—even to a considerable extent—to modifying and improving the processes?

If you look through our sanitation and engineering rules and our designs, you find that we are the victims of uniformity. Uniformity has great administrative advantages, but it also has great administrative danger, particularly if it curbs investigation, inquiry, and critical diagnosis.

Now let's discuss the future—not 1980, but the future of tomorrow morning. There are a few happenings which have encroached upon the environmental control area and to which we are not giving—in research, administration, or finance—the attention we should.

The Chemical Environment

The first of these happenings is the tremendous advance in the chemical industry. This area of unparalleled expansion is of interest not only because it has increased tenfold in the past 25 years, but also because it deals in a field in which neither the producer, the user, nor the engineer has detailed, accurate knowledge of what is being produced in the way of wastes. It is a strange situation.

Our chemical problems of 25 years ago had elementary simplicity compared with those found in the Kanawha River or the other

branches of the Ohio, and even in such streams as the Columbia. The kind of scientific information we need is lacking. We do not even have the instrumentation for identification or measurement.

There is also a tremendous technologic challenge in determining the peripheral effects on those who use this increasingly massive chemical production.

What is the effect of the great array of materials that are placed on the market and sold through radio, television, and newspaper advertisements? What are the products that everybody uses? What is in them? What effects do they have on people? How do we know? Are those effects subtle? Are they long term? Have we any measures for them?

Ionizing Radiation

A second happening is in the field of radiation. About 6 years ago the field was challenging, but it seemed circumscribed, geographically, in total production and in numbers of facilities. Only a handful of locations and installations had been developed, though it is true that they were big, as we thought of them then.

On a map of the production facilities in the field of nuclear fission today, there is hardly a spot in the United States which has not been used for developmental purposes. An additional characteristic of the nuclear energy industry is that, unlike most others, it has gone into areas which normally we would have said would always be isolated.

Radiation is a subject which many if not most health officers and sanitary engineers have avoided. Partly this avoidance is due to the mystery of the scientific practices, partly to the mystery of the terms, and obviously to the mystery of the effects.

This is another area of environmental problems that puts us back in the period between 1800 and 1880 in this respect: We attempt to control a situation without the guidance of the microbiologist. The heavy chemical industry and the radiation industry lack microbiological and physiological criteria. Even when we can determine the extent of contamination, we cannot predict with certainty the physiological effects. The situation is reminiscent of the days

when we began to filter water without knowing why we filtered it, except that people did not like what they were getting. Today, people do not even know what they are getting or where it is coming from.

There must be in the local, State, and Federal agencies that degree of imagination and foresight that would bring more satisfactory indexes for measurement and control. The engineers are not too patiently sitting around waiting for the answers which have come from bench and field investigations, with epidemiological findings as primary guides.

The Virus Diseases

Recently, one of the distinguished workers in the field of poliomyelitis chatted about its impact upon our public health problems and controls. He said: "There may come the day—and it may not be very far ahead—when we will have in this country one of the largest poliomyelitis epidemics of a waterborne nature that the world has ever seen. Everything that I know and have done and have found in our laboratories and in the laboratories of others about its probable epidemiology leads me to the feeling that if our guard is down, and down for even a very short interval of time, with our present sensitive population which we did not have a quarter of a century ago, we will get a disaster."

Another investigator commented with respect to infectious hepatitis: "I don't know what the route of this particular virus will be in its impact on the American population. I do know this: It will be one that should be protected by environmental sanitation. Of that I have little doubt."

Most observers are convinced that part of the control of these viruses is an environmental sanitation problem. It is a problem of food and water. It is curious to have these viruses come into the environmental sphere of interest because they are, strangely enough, in water, the field of our orthodoxy. And we have taken our sights off the field of water supply.

We shall be pushed into a revived interest in water control—and I dislike to admit that the only thing that will push us back into that emphasis in every health department is a calamity. If you look over public health history, and par-

ticularly environmental sanitation history, there are periodic reminders, by epidemic, of where we fail.

When we thought we had done everything we could do with the control of milk, we had the Montreal epidemic. A modest mistake, an interesting shift in a valve, and there were 4,000 cases of typhoid fever. On the European scene, particularly in the German area, large numbers of typhoid fever cases of a waterborne origin are occurring in populations which apparently for many years had believed that the water controls were supreme, accurate, and, therefore, could be forgotten.

Again we must turn to research. Quite recently a laboratory technique—cultivation of the Brunhilde virus in the brain of mice—has been developed which may make virus studies many times more practicable than they were in 1952. We seem to be mastering identification and growth of the virus on a simpler, cheaper, and more rapid basis. We may have to wait awhile longer. But now that the technique is available, we ought to sail into detailed developmental studies.

What do our orthodox water and sewage treatments do to the viruses? How do they behave? A year ago such exploration would have taken the whole Federal environmental research budget. Chimpanzees alone would have required a large part, but there is indication that with tissue cultures and mice the answers can be searched for with greater skill, economy, and speed.

Other Environmental Problems

In this country we thought we were rid of the insect and rodent vectors until the 1952 reminder—the human encephalitis outbreak in the Central Valley of California and one of the largest in recent history.

An engineer has to look 30, 40, or 50 years hence in most of his developments, so that I risk the prophesy that we will have repetitions of insect- and rodent-vectored diseases in this country.

Morbidity and mortality statistics reflect conditions which challenge the engineer. I look at the poliomyelitis record, dramatic as it is; I

look at the typhoid record, low as it is; I look even at the respiratory diseases, the sclerotic diseases, and so on, and I find the accident total rate outstrips them all.

Home, highway, and industrial accidents are a leading challenge to public health engineers. And our health departments, not by fiat, not even by conscious agreement, 30 years ago seemed to have ruled accident prevention out of their obligation. I am glad to see that there are evidences that they are going to rule it in again. Why is it all right to kill a child in the house by a defect in structural arrangement or to kill the child on the public street by an engine, but it is not all right to kill it by a virus?

The latter challenge we have accepted in full. About the former, we still have some hesitation. I predict we will have to take it; the public demands we should.

Water for Washing

In Korea last year, a medical investigator of epidemic hemorrhagic fever said to me: "You know, from the standpoint of environmental sanitation, I would say one of our biggest deficiencies up here, and maybe one that would have reduced our mortality and sickness tremendously, is not what you people are always talking about in the sanitary field, namely, the quality of water. The thing that impresses me most is importance of the minimum quantity of water—quantity per se—which insures the capacity to be clean. One of the great demonstrations to me on the front, with all of our diseases, is that quantity of water as a disease deterrent has been ignored."

This is an interesting point of view which I confess I have never thought of before be-

cause we live with an abundance of water—not for drinking only, but for all of its multiple sanitary uses. When you get into periods or areas of shortage and stress, the mere ability to wash has a tremendous public health significance.

"I don't even care," this same investigator said, "If they wash in a polluted stream—if only they can wash."

Physiological Engineering

Much of what I have described awaits developments in collateral fields. I now wish to note an engineering field which is subtle and remote.

As we become better acquainted with the physiologist, he says: "Why is it that the engineer stays away from the piping system of the human being? Why does he feel that all hydraulics are restricted to cast iron pipe? Why doesn't he interest himself in the mechanisms of viscosity, of deposition, of corrosion, and the like in arteries?"

The physiologist asks for participation. He says: "Why don't you interest yourself in the filtration system of the kidney? We read your material on filtration through sand. We have a system of capillary filtration which outstrips almost anything you know. We would like some light on hydraulics. Why do you deal with pumps if they are made of metal, but you don't interest yourself in the umbilical cord, which is one of the finest and most interesting and baffling pumps that we know of?"

This is jumping, maybe, into 1955 or 1960, but we should be whetting the interest of promising young engineers in the field of physiological mechanisms.



The Public Health Laboratory

—Yesterday, Today, and Tomorrow—

By ALBERT V. HARDY, M.D., Dr.P.H.

THE SUBJECT upon which I have been asked to speak is timely for me since this is the 50th anniversary of the opening of Florida's public health laboratory. At such a time one is stimulated to look to the past, is at liberty to critically examine the present, and may be at ease in suggesting desirable or possible trends for the future. The history, present activities, and outlook of the various State public health laboratories, though differing in some aspects, still have many features in common. Due to my familiarity with it, Florida's experience will be used as illustrative of the past and present and as a point of departure in considering the future.

The nature of the work of Florida's public health laboratory as it has developed in the past five decades is shown in broad outline in table 1. The rapidity of growth is striking. From 996 specimens in 1903, there was an increase to 15,949 in 1910. The requests for service quadrupled in the next decade, trebled in the twenties and in the thirties, and doubled in the forties. At first the laboratory must have been used almost exclusively to aid in the diagnosis of

clinical cases, since prior to 1910 from one-quarter to more than one-half of the specimens were positive in the test requested. At present there is an active concern with the detection of carriers and with case finding, and many specimens sent in for examination come from healthy individuals. Even with exacting techniques the current proportion of positive findings is low. Having grown in an era of development and change, the public health laboratory manifests these characteristics of the age.

The Change in Emphasis

The laboratory experience with malaria, diphtheria, and typhoid in Florida is shown first in table 1 by the number of specimens examined and then is further related to available morbidity and mortality data in table 2.

At the beginning of the twenties, when there were 1,865 reported malaria cases and 352 deaths due to malaria, there were 6,537 examinations for this disease in the Florida State public health laboratories. This was an average of 4 examinations per reported case and 19 per reported death. Malaria declined in the years following, but the number of laboratory examinations increased, reaching its peak in the early forties. In the latter half of the past decade, the incidence of malaria fell rapidly while the number of requests for laboratory tests for the disease decreased slowly. In 1950, there were 351 laboratory examinations per reported case of malaria and 614 per reported death. It was then necessary to call to the attention of physicians the rarity of positive findings for malaria and to urge a

Dr. Hardy has been the director of laboratories, Florida State Board of Health, since 1946. His review of public health laboratory services was presented to the laboratory section of the Southern Branch of the American Public Health Association at its annual meeting in Atlanta, April 23, 1953. It was one of a series of papers arranged by the chairmen of the respective sections, each dealing with one phase of the general subject "Public Health, Yesterday, Today, and Tomorrow."

Table 1. Number of specimens submitted for examination to the laboratories of the Florida State Board of Health, and percentage found positive, by year

Examination	1910		1921 ¹		1930		1940		1950	
	Number	Percent positive	Number	Percent positive	Number	Percent positive	Number	Percent positive	Number	Percent positive
Malaria.....	2,379	26.3	6,537	3.9	11,614	6.3	20,758	2.1	2,456	0.2
Diphtheria.....	716	27.4	13,688	13.1	14,916	4.9	19,570	2.3	4,439	2.3
Typhoid ²	1,958	27.7	4,679	10.8	7,226	2.1	10,318	2.5	10,036	.7
Tuberculosis.....	1,515	25.4	3,880	17.7	4,239	14.9	11,658	11.3	31,038	13.3
Syphilis ³	0	-----	17,459	34.2	64,377	16.8	346,638	17.8	627,092	16.3
Gonorrhea ⁴	605	42.2	3,180	31.2	9,363	21.4	35,087	12.8	52,836	12.2
Hookworm.....	7,408	56.0	8,956	38.4	38,342	28.0	97,936	28.8	130,447	18.6
Rabies.....	53	54.7	218	45.0	233	29.6	303	22.1	513	14.2
Culture diagnosis:										
Enteric.....	0	-----	0	-----	0	-----	3,016	⁵ 3.0	30,810	⁶ 2
Gonorrhea.....	0	-----	0	-----	0	-----	79	22.8	31,062	5.3
Miscellaneous.....	0	-----	0	-----	0	-----	0	-----	⁶ 5,378	-----
Veterinary public health.....	0	-----	0	-----	0	-----	0	-----	767	-----
Water.....	51	-----	2,296	-----	6,200	-----	10,003	-----	47,554	-----
Milk.....	80	-----	133	-----	(⁷)	-----	6,027	-----	19,704	-----
Chemistry.....	0	-----	0	-----	0	-----	84	-----	68,391	-----
Research.....	0	-----	0	-----	0	-----	0	-----	8,489	-----
Other.....	⁸ 1,184	-----	5,778	-----	20,069	-----	0	-----	⁹ 14,708	-----
Totals.....	15,949	-----	66,804	-----	176,579	-----	¹⁰ 561,447	-----	1,085,720	-----
State population.....	753,000	-----	993,000	-----	1,480,000	-----	1,915,000	-----	2,797,000	-----

¹ Data for 1920 not available. ² Widal. ³ Serology. ⁴ Smears. ⁵ Positive for *Salmonella typhosa*. ⁶ New activity. ⁷ Data not available. ⁸ Predominantly clinical laboratory examinations. ⁹ Rh tests entirely. ¹⁰ In part an estimate based on the number of examinations reported.

discontinuation of a relatively routine submission of specimens for malaria examination in undiagnosed febrile illnesses.

When malaria was common, an erroneous positive finding would have had minor public health and little clinical significance. Now, one of our problems in malaria is the occasional apparently unfounded positive report offered by clinical laboratories. In earlier years, it was acceptable for competent technicians in the clinical or public health laboratory to examine malaria slides. Now, accuracy of the highest degree must be attained, and this requires the participation of qualified parasitologists.

There has been a similar experience with diphtheria. The laboratory activity in this disease increased from 4 examinations per case and 55 per death in 1910 to a peak of 88 examinations per case and 725 per death in 1940. Thereafter the requests for examination fell more rapidly than the incidence of the disease.

The individual test is better at present so fewer examinations may be adequate, but perhaps there is undue complacency and insufficient activity. The volume of work in typhoid increased even more markedly (tables 1 and 2). Thus the trend in laboratory examinations in these three communicable diseases has been an increasing number of specimens with a decreasing proportion of positive findings. As the incidence of the infections fell to low levels there was a slow decline in examinations requested, a large number of examinations per reported case or death, and a much lower proportion of positive findings, but each laboratory test and particularly each positive finding now has increasing significance, and reliability of the highest order is required.

Better Diagnostic Tests

By comparison, consider Florida's present position in examinations for tuberculosis and

syphilis (table 1). The laboratory is still in the phase of trying to provide adequate diagnostic and case-finding services. The percentage of positive findings remains high.

The objective in tuberculosis is to detect the infection prior to the onset of clinical symptoms. The mass X-ray surveys and routine radiological examinations of all patients admitted to some hospitals point to individuals warranting study, but it is the responsibility of the laboratory to ascertain whether the suspicious radiological shadow is caused by *Mycobacterium tuberculosis*. Much more sensitive bacteriological tests than those available in the past or at present are needed, and the best available present procedures must be applied by highly qualified workers. Laboratory work in tuberculosis is at its beginning, not nearing its end.

In syphilis, the laboratory has even broader responsibilities since it must provide both the screening and the diagnostic tests. Considering their nonspecific nature, the standard serologic procedures have proved surprisingly effective. These simple examinations undoubtedly still need to be used freely in Florida. Standard serologic tests for syphilis are satisfactory as screening tests, but they have serious limitations as diagnostic laboratory examinations. A more highly specific test is needed. The *Treponema pallidum* immobilization test probably represents an early step to this end. If an obvious need is to be met, State laboratories in the future must make available both a simple screening test and a more highly specific diagnostic test for syphilis. The latter

will be more costly, will increase the volume of work, and will require unusually competent professional workers, but it is one of the many challenging tasks ahead.

There is no basis for pride in the record of attainments in the laboratory diagnosis of gonorrhea. Treatment for gonorrhea is simple at present. The laboratory procedures, however, are difficult and their reliability is uncertain. For these reasons there has been a tendency to omit diagnostic laboratory tests, and serious consequences are evident. Nonspecific urethritis is being diagnosed in epidemic proportions, but such a diagnosis signifies only that the case was not proved to be a neisserian infection. Here is a bacteriological problem. Gonorrhea and similar conditions appear to need more, not less, attention.

There will be no disagreement in public health history as to the past prevalence and significance of parasitic infections in the Southern States. Hookworm disease in the early part of the 20th century was a serious cause of morbidity. Many parasitological examinations have been done in the past and in Florida this work continues to increase. There will be differences of opinion as to the present importance of this activity. Optimum health, not the mere absence of obvious illness, is the objective of public health and obstacles to the attainment of this goal must be removed. The individual has a right to be free of parasites. This may be attained by sanitation, a slow but a permanent solution. The rapid and still needed approach is through laboratory diagnosis and treatment. There is unfinished business here.

Table 2. Number of reported cases and deaths from malaria, diphtheria, and typhoid in Florida, and number of laboratory examinations per reported case and death, by year

Year	Reported cases			Examinations per case			Reported deaths			Examinations per death		
	Malaria	Diphtheria	Typhoid ¹	Malaria	Diphtheria	Typhoid ¹	Malaria	Diphtheria	Typhoid ¹	Malaria	Diphtheria	Typhoid ¹
1910.....	(?)	182	(?)	(?)	4	(?)	(?)	13	(?)	(?)	55	(?)
1920-21 *...	1,865	576	525	4	24	9	352	78	140	19	175	33
1930.....	576	491	141	20	30	51	332	79	72	35	188	100
1940.....	140	223	109	148	88	95	102	27	23	203	725	449
1950.....	7	97	30	351	46	334	4	8	1	614	555	10,036

¹ Withd. * No data on reported cases and deaths. ² Cases and deaths for 1920; laboratory examinations for 1921.

Except in diphtheria the relative newness of bacteriological culture diagnosis, as is evident in table 1, is surprising. Enteric and gonorrhea cultures have been used chiefly in the past decade; those for tuberculosis, in the past half decade. Miscellaneous bacteriological service is a recent and relatively undeveloped addition to public health laboratory work in this area. To illustrate opportunities, for example, otitis externa is a widely prevalent and troublesome disorder common in summer months in the South. Physicians commonly call this entity "otomycosis" but recent studies have indicated that this is a bacterial rather than a mycotic infection. The modes of treatment are being radically changed as a result of bacteriological studies. Rightly or wrongly, swimming and the quality of water in pools and at our beaches are under suspicion. Here is but one of many neglected bacteriological diagnostic fields which warrant attention.

With the growth of veterinary public health has come the need to provide laboratory service for our public health veterinarians. The development of this work in Florida in the past 3 years has proved most interesting. The bacteriological diagnostic work in anthrax was new to us. Leptospirosis in cattle and dogs has come to the fore. There have been tests for a wide variety of poultry infections. Bacteriological studies of edible meats and in abattoirs have been revealing. Lacking a veterinary diagnostic laboratory in Florida, the veterinarians have looked to us. It proved practicable for a public health laboratory to provide diagnostic service in animal as well as in human infectious diseases. Wherever there is no animal diagnostic laboratory, interdepartmental cooperation, rather than separate and independent laboratories, would be economic and advantageous.

No progress in providing aid in the diagnosis of virus infections, other than rabies can be reported from Florida's public health laboratories. These new and newly recognized entities are of increasing importance. It appears probable that within one to two decades it will be standard practice in public health laboratories to use tissue cultures and embryonated eggs as

well as serologic procedures and animal tests for rather routine diagnostic studies of virus diseases. State laboratories need to begin to provide opportunities for some of their workers to obtain training in the exacting field of virology.

Public health laboratories were developed as a result of the urgent pressure for the control of communicable diseases. There has been gratifying progress in this field and the laboratory has played an essential role. The goal of the virtual elimination of communicable diseases is beginning to be attained. In those infections in which there has been most progress in control, increasingly dependable laboratory diagnostic tests are required to identify accurately the residual infections. In such major diseases as tuberculosis and syphilis, there is much work ahead in satisfying the diagnostic laboratory needs; in others, notably the virus diseases, scarcely a beginning has been made. In communicable diseases, well acknowledged to be a responsibility of public health laboratories, there are still unmet needs and new opportunities.

In the above activities the laboratory is providing service to physicians, health officers, and epidemiologists. There is work also requested by sanitary engineers and sanitarians. There has been a recent marked increase in the examinations of water and milk in Florida. As local health departments have been organized in the State the quality of the water and milk available to the public has been checked more adequately. There are still localities in the State, and undoubtedly in every State, which do not receive this elementary public health protection. This work must continue and will undoubtedly expand.

New Responsibilities

The fluoridation of water has added a new responsibility. Periodic checks will be required at the water plants. It is the proper function of the public health laboratory to serve as a control laboratory; highly dependable findings on specimens submitted periodically will be required.

The chemical services appropriate for a public health laboratory are only beginning to

develop in Florida. At present this work includes: some diagnostic tests such as tests for protein in spinal fluid, hemoglobin tests which are given to the prenatal cases attending public health clinics, and check tests for the diabetes screening program. The service also includes the detailed chemical analysis of water and other miscellaneous chemical tests. But the toxicological problems are the ones of most interest and of highest importance, and their solution is a service needed by the law enforcement agencies of the States and their counties. Unless otherwise covered, this important field is open to public health laboratories.

The environment of the industrial worker properly receives special attention. Commonly, but in my opinion unfortunately, the industrial hygiene laboratory functions apart from the general public health laboratory. Concerned for so long with communicable diseases, the general public health laboratory was not well prepared for the responsibility of providing laboratory service to industrial hygiene units in health departments when that work was initiated. Eventually this work should be incorporated with the broadened activities of the public health laboratory. Such an arrangement will be economical, and with carefully selected personnel and desirable cooperative relationships it will be a more efficient organization of public health services than the widely prevailing present arrangement.

In the future it is probable that substantial attention will be given to air sanitation. Control of environmental pollution caused by radioactive substances may be required in many localities rather than in a few. The extent of laboratory participation in such activities cannot be estimated at this time.

In the past and largely at present, the public health laboratory has been and is a diagnostic laboratory performing simple tests in large numbers. In general, it has been given the type and number of personnel adequate only for this work. No laboratory can grow satisfactorily under these conditions. If laboratory personnel are to develop, and if laboratories are to retain able workers, satisfying opportunities for special studies must be provided. Moreover, there are numerous investigations which can be conducted only through public health

facilities. An urgent need for the public health laboratory is to attain a satisfactory balance between diagnostic services and special studies, a development which is still at a very early stage.

What of tomorrow's work in the chronic diseases? It is reasonable to expect that case-finding programs will eventually be accepted as a proper field of public health activity. Useful tests to indicate the probable occurrence of early malignancy or to detect chemical aberrations leading to arteriosclerosis could drastically modify the extent and character of laboratory work. When the Florida laboratory was organized, there was no serologic test for syphilis but now the performance of these examinations is a major activity. The early detection of predisposing causes or the early signs of chronic disease conceivably may be the major activity of the public health laboratory 50 years from now.

Educational Opportunities

In considering programs of the future, careful attention needs to be given to educational opportunities and responsibilities. It is well to examine programs of this type which have established their value in our sister bureaus. Seminars and short courses are an accepted part of the maternal and child health and venereal disease programs. More recently, educational programs of this type have proved notably effective in cancer, diabetes, and heart disease activities. They are designed solely to help the practitioner serve his patients better. Likewise, in the laboratory field, there are rich opportunities to aid clinical laboratory workers to provide more dependable and uniform results to the physicians they serve.

This will bring the public health laboratory into intimate contact with the medical technologists. Laboratory workers in the medical field need to develop as a professional body. There should be strong State and local organizations drawing together all those in this field who serve in hospitals, clinics, physicians' offices, private laboratories, public health laboratories, or elsewhere. In any such organization the bacteriologists, serologists, parasitologists and clinical chemists should join with the general

medical technologists. The public health laboratory is in a position to give leadership. Every influence must be used to assure that the strength of an organization of medical laboratory workers rests on its high educational value. In the future we can aid in bringing to maturity an allied professional body of high importance in the medical field. When this is attained, it will be natural to work with, or as a part of, this organized professional body and its allied State and local groups to improve the quality of laboratory practice—an activity which eventually should receive the endorsement and commendation of pathologists, medical practitioners, and the public they serve.

It has proved advantageous in Florida to work closely with laboratory personnel in the dairy industry. An annual refresher course giving detailed attention to selected problems, with opportunities for laboratory practice, has been received favorably. Representatives of the State Department of Agriculture, the dairy science division of the University of Florida, and the State Board of Health cooperated in planning the course which has served to draw together technologists from the dairy industry and the public health "control" laboratories. The initiative and leadership in this activity came from the State public health laboratory.

Educationally, there is a continuing need to participate in discussions at meetings of physicians, nurses, sanitarians, and others who use public health laboratory services.

Personnel Practices

The development of laboratory programs and planning for laboratory personnel must go hand in hand. There have been gratifying advances in personnel practices in public health. Retirement plans offer inducements for long-term career service. Salaries have been raised to a more adequate and equitable basis. These are some of the favorable features, but there are also weaknesses and problems.

Under any plan providing for slow advancement in long-term careers, there is always the possibility of losing the better workers, and, through personnel seniority policies, the possibility of having the less ambitious, the less imaginative, and the more easily satisfied per-

sons in senior positions. The only solution to this potential problem is its prevention. There must be greater flexibility to permit the rewarding of exceptional persons; there must be even greater care in personnel selection, and especially in promotion to positions of senior responsibility.

Stagnation is a real hazard of career service and a particular risk to those in repetitive routine activity such as in the laboratory where large numbers of the same tests are performed day after day. There are safety devices here. Academic advancement is to be encouraged. We have been highly pleased with a cooperative relationship between the Florida State public health laboratory and the University of Florida, which permits promising junior workers to accumulate academic credits while employed and, equally important, which requires senior workers to teach. The limited investigations required for the master's degree thesis has stimulated keen interest in these activities. Workers advancing academically who are given opportunities and encouragement in research will not stagnate.

Laboratory work today is teamwork, not individual activity. This accentuates the importance of the problem of personnel management. The reliability of laboratory findings varies with the worker's emotions as well as his ability. Directors or departmental chiefs are managers of laboratory teams and need a sympathetic understanding of human emotions quite as much as technical skill and scientific knowledge. The laboratories of the future must be recognized above all as groups of human beings working together. Facilities, equipment, and reagents are required, but harmonious teamwork, just as much as material tools, determines the dependability of findings.

Summary

The record of the past has been written. During the first chapter of the history of the public health laboratory, attention was concentrated on the acute communicable diseases. Tests at first were employed largely for confirmation of diagnosis; later they were used in increasing numbers for case finding and the detection of carriers. More exacting tests by more expert personnel became essential for the

accurate identification of residual infections.

Major emphasis is directed to the chronic infections during the second and present chapter of the history. The need for simple procedures for case finding and for more highly sensitive and specific tests for diagnosis has become evident.

For the future, there are numerous unexplored problems in viral and other infectious diseases. Ahead, there is a call for continuing and increasing work in sanitary bacteriology, a broad development in public health chemistry, closer integration of all laboratory services provided at public expense, new and expanding

work in chronic diseases, and an educational program designed to aid in improving the quality of medical laboratory service wherever it is performed. Special studies and active research programs will be required to encourage the development of laboratory personnel and to elevate the stature of the public health laboratory.

Looking to the future, we must obtain adequate facilities; acquire, train, and retain highly competent professional laboratory workers and aid each in attaining a highly satisfying and productive professional experience. Opportunities and needs of the future equal or exceed those of the past.

Amyotrophic Lateral Sclerosis

A major study of amyotrophic lateral sclerosis is under way on Guam where the disease is highly prevalent. The contributions of heredity and environment to the development of the disease will be investigated on the island which has a population that is relatively fixed. The National Institute of Neurological Diseases of the Public Health Service, the Bureau of Medicine and Surgery of the Navy, the Department of the Interior, and the Government of Guam are cooperating.

Amyotrophic lateral sclerosis is a degenerative disease of the nervous system which strikes most frequently between the ages of 30 and 55. There is no treatment for it. Its cause is unknown. Frequently assigned to the large class of demyelinating diseases of which multiple sclerosis is the best known, the disorder is pathologically characterized by demyelination of the brain and spinal cord—a breakdown of the fatty covering of nerve fibers. Popular attention was directed to it when Lou Gehrig, a baseball player, became one of its victims.

There seem to be two types: one, a slow progressive type primarily paralyzing the muscles of the hands and arms, and eventually affecting other organs; the other, a more rapidly progressive type, where shoulders, neck, tongue, lips, palate, and pharynx are initially involved and paralyzed. In the latter, the bulbar type, death by asphyxia or from aspiration pneumonia usually occurs within 2 years.

Whether amyotrophic lateral sclerosis is as prevalent on Guam as is believed, whether it is exactly similar to the disorder as it is known elsewhere, and what may be its possible cause or causes are objectives of the study. Neighboring islanders will also be studied to determine if the disease is typical for Guam alone or for other islands in the Marianas as well.

Cancer Morbidity Studies In Metropolitan Areas

Two out of five patients with newly diagnosed cancer will die within 1 year unless a better record of early diagnosis is made; more than 500,000 new cases of cancer will be diagnosed in 1953; but only half of these new cases will be diagnosed while the cancer is localized, according to estimates made by the biometrics section of the National Cancer Institute, Public Health Service.

The recently completed studies on cancer morbidity in 10 metropolitan areas indicate that the current outlook with respect to the survival of cancer patients is not favorable. That the survival of cancer patients depends largely on the stage of the disease at time of diagnosis—whether the cancer is localized or has spread beyond the primary site—is strongly pointed up by the reports. The more accessible the cancer site to direct examination, the greater is the opportunity for its early discovery. Half of all cancer involves sites accessible to direct examination. Exclusive of skin cancer, 48.2 percent of all cancers in females and 22.6 percent of all cancers in males are located in accessible sites.

Only 64 percent of newly diagnosed cancer cases survived 1 year, according to the studies. When skin cancers, which have a high cure rate, are excluded, the survival rate is reduced to 58 percent. Among cases diagnosed while the cancer was localized, 84 percent of the patients survived 1 year. This rate may be compared to the 1-year survival of the 58 percent who were diagnosed after regional involvement had

occurred and the 28 percent who were diagnosed after remote spread of the disease.

Cancer of the uterus provides a striking illustration of the effect of stage of disease at time of diagnosis on survival; the 1-year survival rates were 91 percent for localized cases, 71 percent for cases with regional metastasis, and 36 percent for those diagnosed after remote metastasis had occurred.

Except for skin cancers, the percentage of cases diagnosed while localized is low for cancer developing at sites accessible to direct examination. These sites are: skin, prostate, rectum, mouth and pharynx, thyroid, breast, and uterus.

In cancer of the breast, a highly accessible site, only 2 out of every 5 cases are diagnosed while localized (40 percent). The proportion is less than 3 out of 5 for cancer of the uterus (57 percent), and it is 1 out of 2 for cancer of the prostate (50 percent). For cancer of the rectum in both sexes, the proportion is less than 1 out of 2, or 45 percent for males and 46 percent for females.

The cancer morbidity series cover Atlanta, New Orleans, Birmingham, Dallas, San Francisco, Denver, Chicago, Detroit, Pittsburgh, and Philadelphia. These cities were originally surveyed by the National Cancer Institute in 1937–39 and were resurveyed in 1948–49.

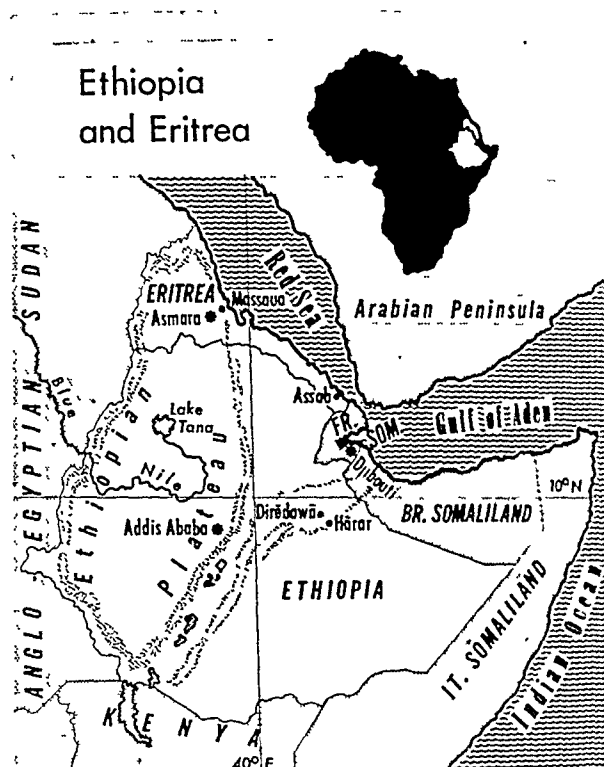
In preparation is a summary report which will provide comparative statistics for the two survey periods on cancer incidence, prevalence, and mortality as well as the relationship of cancer to such factors as primary site, sex, age, and race.

Separate reports of the 10 survey areas, covering both survey periods, have already been published. The reports on the 1948–49 series have been reviewed in recent issues of *Public Health Reports*. Inquiries concerning the series should be directed to the National Cancer Institute, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda 14, Md.

Reported by the National Cancer Institute, National Institutes of Health, Public Health Service.

Mapping a Program Of Public Health For Ethiopia And Eritrea

By HENRY R. O'BRIEN, M.D., M.P.H.



Historically significant because of its fierce resistance to political and cultural invasion for 16 centuries, Ethiopia is today undergoing many crucial changes . . . Being officially welcomed are scientists, teachers, and health workers from other lands, who seek to introduce to this country the benefits of modern advances in medicine and public health . . . One of these public health workers reports his field observations on some of the health problems he found and some of his suggestions for their solution.

ETHIOPIA and Eritrea—politically independent, and since September 1952 federated by a decision of the United Nations General Assembly—are experiencing the ferment that has enveloped all Africa.

Both countries lie historically and geographically between the world of the Arabs, the eastern Mediterranean Sea, and equatorial Africa. Together, they form a rich agricultural reservoir of grain, cattle, and coffee.

In May 1951, a representative of the Technical Cooperation Administration (now a part of the Foreign Operations Administration) visited Ethiopia to discuss cooperative programs. Soon afterward, the Imperial Government of Ethiopia, through the American

Embassy in Addis Ababa, invited the Public Health Service of the United States to send a representative to Ethiopia to "recommend a specific project for public health preventive measures."

This report is an accounting of the observations of health conditions in Ethiopia and Eritrea and the recommendations which were made.

The Land and the People

Situated in the northeast corner of Africa, Ethiopia, known also as Abyssinia, is more than a third larger than the State of Texas. Its population is between 10 and 20 million.

Most of the country lies on a high plateau, reaching as high as 9,000 feet above sea level, and rising in sharp escarpments from the plains on the east and west and more gradually on the north and south. The plateau has been cut in deep gorges by the erosion of the Blue Nile, its tributaries, and other rivers, and is divided by the great Rift Valley.

The country is largely deforested. Heavy rains come in June through September, with lighter rains in February and March. Temperatures at 8,000 feet may fall from a high of 85° F. during the day to 40° F. in the early morning.

The size of the State of New York, Eritrea lies on the northern tip of the Ethiopian plateau. The high land gives way to an intermediate level on the east and west and then finally to the deserts of the Sudan (on the west) and to the narrow coastal plain along the Red Sea.

There is less water in Eritrea and more deforestation than in Ethiopia. Eritrea is a little warmer. Its roads and communications are noticeably better than those to the south in Ethiopia. Grains are the chief crop on the plateau, and some coffee is grown there. Cotton is raised in the western section. The people number between 1.2 and 1.8 million.

The ancestors of the Ethiopians came from southwest Arabia some 3,000 years ago, but the original Semites intermarried extensively with the Hamitic or Berber strains of northern Africa. Conquered negroid tribes are found in the south and west.

Some 40 languages are spoken in Ethiopia. Amharic is the first official tongue, and English the second. In Eritrea, the official languages are Arabic and Tigrinya, which is related to Amharic. In both countries, instruction in the schools, beginning with the fifth grade, is in English.

Ethiopia has long been a part of the eastern Mediterranean world—ever since Greek vessels sailed down the Red Sea. Christianity was first introduced in 350 A.D., and a Coptic Church developed, which has maintained itself in sturdy independence for 16 centuries. From the eighth century on, Moslem waves swept over much of the surrounding area and threatened Ethiopia again and again. Isolated by its

fiercely hostile neighbors, Ethiopia was known to Europe only through rumors as the "land of Prester John," the legendary medieval priest and king. Today, the people of both Ethiopia and Eritrea are Copts, Moslems, or pagans. These groups live together harmoniously.

In the European rush for territory in Africa during the late 1800's, Eritrea came under Italian control. Ethiopia was threatened with conquest too, but it remained independent until the Italian seizure in 1936. East Africa was liberated by British and other Allied armies in 1941. As a result of the long Italian occupation and the later British administration, the Eritreans are today more accustomed to Western ways than are the Ethiopians.

For the past century, the influence of the West has been increasingly felt in Ethiopia. Even when he was regent (from 1916 to 1930), Haile Selassie had started plans for the modernization of his country. His efforts were intensified on his coronation as Emperor in 1930. On his return from exile in 1941 after Ethiopia's liberation, the process began anew. The Emperor stresses education as the basis for general progress. He believes that advance must take place gradually on an even front—in health, education, agriculture, communications, and in-

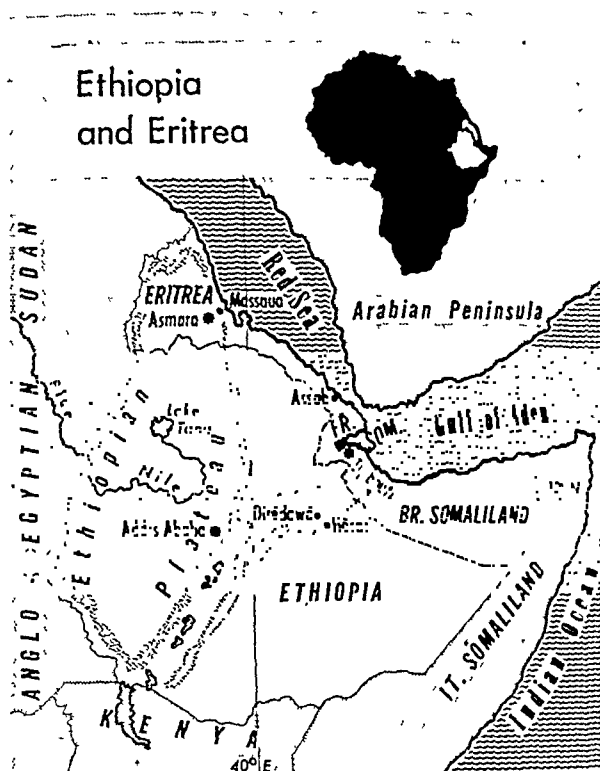
Dr. O'Brien bases his observations in this field report on the 3½-month survey of Ethiopia and Eritrea which he made in the latter part of 1952. Now a special assistant in Region III (Washington, D. C.) of the Department of Health, Education, and Welfare, Dr. O'Brien was formerly chief of the educational programs branch of the Division of International Health, Public Health Service.

Dr. O'Brien was stationed in Thailand with the Rockefeller Foundation at Bangkok from 1921-24 and with the McCormick (Presbyterian) Hospital in Chiengmai from 1926-30. During World War II, he visited 11 countries in the Near and Far East in connection with the medical activities of the United Nations Relief and Rehabilitation Administration. Between 1931 and 1943, Dr. O'Brien was engaged in State and local health work in Ohio, New York, and Connecticut. He is a commissioned officer in the Public Health Service.

The pictures in this field report are photographs taken by Dr. O'Brien.

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system in Ethiopia, and Addis Ababa has telephones and a radio station.

At a weekly market, to which people walk from miles around, a vendor may be seen selling little measures of salt brought up from the desert plains along the Red Sea. Another sells factory-wrapped cakes of soap of a well-known brand. Hand-forged spearheads are displayed in another part of the market and both foreign and domestic cloth in still another.

Some 15 communities, from the capital of Ethiopia to a small village, have public water supplies. Most of these are inadequate, and equipment is wearing out. Otherwise, the housewife carries water, often over long distances, in a clay jar from a spring or stream or waterhole. There are some septic tanks and pit privies in Addis Ababa. The municipality also collects rubbish. Harār has a few public comfort stations.

Health Conditions in Ethiopia

Although there are no epidemics at present in Ethiopia, the country is steadily drained by major endemic diseases. Syphilis and malaria, gonorrhea and the pneumonias seem to be the most prevalent. In the highlands, malaria follows the end of the rains. Lower down, it is endemic. Louseborne typhus is widespread: 8 cases were noted in 1 ward of a 100-bed hospital. Flea- and tick-borne typhus are also present. Relapsing fever is endemic. Amebic and bacillary dysentery are prevalent. Cerebrospinal meningitis appears in local epidemics from time to time. Tuberculosis is a serious problem and has increased since the Italian occupation. One estimate for the number of leprosy cases is 15,000.

Next to syphilis, wounds are the condition most frequently reported by the clinics. Trachoma, conjunctivitis, tropical sores, and rheumatic conditions follow. There is general malnutrition resulting from deficient diets and from periodic fasting. Some maternal deaths occur, most frequently from hemorrhage. Infant mortality is high. The village midwife is strangely absent in Ethiopia, but some training in midwifery has started in Addis Ababa. Instruction began in Asmara (Eritrea) some years ago. Scabies is widespread.

Ethiopia's Health Services

Public health first took a definite place in the Government of Ethiopia in 1942 as a bureau in the Ministry of the Interior. In 1947, the bureau became the Ministry of Public Health, which today is the center of health work in Ethiopia. The effectiveness of a health unit is measured by its organization, its program, its personnel, and its budget. Studied in each of these phases, Ethiopia has made distinct beginnings, but the country still has pressing needs.

The existence of a Ministry of Public Health is in itself a distinct achievement. There are now an acting Minister of Health and an experienced Director-General who handle administration for the Ministry. A Swedish physician with the title of Inspector-General serves as adviser to the Ministry. He is a trained public health worker who is devoted to Ethiopia. He speaks both Amharic and Galla. There are at present no Ethiopians in the country who are doctors of medicine. The Ministry has on its staff only 2 Ethiopian workers who are trained in public health: 1 had training in sanitation, and the other in statistics.

In the central office of the Ministry, there are separate bureaus handling administration, sanitation, statistics, foreign quarantine, and medical services. The bureau of medical services operates most of the hospitals in the country, either directly or by contract with one of the foreign missionary groups. The curative work of the Ministry, functioning through the hospitals, is at present its leading activity. Ethiopia has 38 hospitals with 2,315 beds (0.15 per 1,000 estimated population) and 3 leprosariums with 800 patients. There are some 80 physicians in Ethiopia, all foreigners, or 1 per 200,000 people.

The Ministry of Public Health places little emphasis on preventive medicine, although a good central laboratory for vaccine production and research and diagnostic work is developing in the Pasteur Institute of Ethiopia, an autonomous organization technically supervised by the Pasteur Institute of Paris under a contract with the Ministry of Public Health. The Institute also operates an anti-epidemic service, a function which gives it nominal supervision

established. The growth of basic nursing services will depend largely on the continued development of secondary education. Nurses are licensed by the Ministry of Public Health, and a nursing council is active under the medical education board.

Definite plans for local training of physicians are now under way. University College, which opened in Addis Ababa during 1950, accepts students who have passed the matriculation examination. It offers what seems to be a good premedical course and was to have been appraised by an accrediting committee from London in March 1953.

Meanwhile, funds have been collected from government workers to build the Haile Selassie I University in Addis Ababa. The university will have a faculty of medicine. A European businessman recently willed \$750,000 in Ethiopian currency (US\$300,000) for the new university. Bids have been invited for the first building which will include space for the first 2 years of a medical course. More than Eth\$3,500,000 is in the bank for this building. (Eth\$1.00 has an exchange value of US\$0.40.) Classes are planned to start in October 1955, and an enrollment of perhaps 8 students in the first year of medicine is expected.

There are 2 schools of dentistry in Addis Ababa, 1 under the Municipal Department of Health, the other under the sponsorship of the former Minister of Public Health. Neither school has much in the way of equipment, curriculum, or faculty. The teeth of Ethiopians are excellent, and the country has much more pressing health needs than the early development of dental education.

With plans made and training under way for physicians, nurses, and dressers, there is no present provision for an intermediate type of health worker, who has much more training than a dresser receives and less than is required for a physician, to assist the latter and supervise the former.

Budget for Health

The present budget for the Ministry of Public Health is Eth\$3,000,000 (US\$1,200,000). With this the Ministry maintains its hospitals and other health work. It is evident that if the Ministry is to furnish the preventive med-

ical and health services which the country so greatly needs, it must obtain additional funds. Ethiopia is at present operating within its means, aided by today's favorable price for coffee. Funds are being found for other worth-



(Top) A pumphouse of the municipal water system at Jimma (Ethiopia). About 15 communities in Ethiopia have public water supplies. Wells and springs are more common sources of drinking water.

(Below) Mother and child outside the municipal clinic at Asmara (Eritrea). Infant and prenatal care and other health services are provided at this clinic.

while projects in the Government. It is probable that when sound proposals are advanced by the Ministry of Public Health, with a prospect of professional and financial support from outside, approval of the Ministry of Finance and of the Emperor can be obtained.

The Recommendations

After consideration of these and many other points, and after discussing them with the Swedish adviser to the Ministry and with the representative of the World Health Organization, a tentative program was outlined for specific public health measures in Ethiopia. This was gone over orally with the chief of the TCA mission in Addis Ababa, and with his approval was presented to the Director-General of Health and to the Director of the Central Planning Board. Their advice was sought and their reactions were noted for use in the final recommendations. The final report was addressed to the TCA chief for transmission to the Ministry of Public Health.

In substance, the program included five recommendations:

A demonstration health department and field training school for medical assistants to be set up in one of the provinces, with cooperative support in supplying both staff and equipment from the Ministry of Public Health, the Technical Cooperation Administration, and the World Health Organization.

Three health workers to be assigned by TCA for immediate needs—a sanitary engineer to work with the Ministry of Public Health to improve community water supplies, another to be stationed by the Ministry in the Addis Ababa Municipal Department of Health, and a health educator to be loaned by the Ministry of Public Health to the Ministry of Education for training of teachers in school health.

More fellowships abroad in professional fields where such training is not available in Ethiopia. Properly used, such fellowships can advance public health in Ethiopia by a good many years.

A limited amount of badly needed equipment and supplies for the schools of nursing, and medical journals and reference books for the hospitals.

A chief of the health section of the TCA mission to maintain contact with the Ministry of Public Health, the World Health Organization, and the Technical Cooperation Administration for coordinating the above activities and for supervising the smaller health programs requested by Eritrea. He would also aid in plans for the medical school.

Eritrea's Needs

Only a week was available for a study of Eritrea, but that time permitted visits to the health institutions and to several schools in Asmara, and to a regional hospital, a health center, and a dresser station in the provinces.

A local government committee had worked out a possible health program with the TCA deputy director for Eritrea. It gave high priority to a request for schools of nursing, midwifery, and laboratory technique to be started at the 1,000-bed Civic Hospital in Asmara and also asked assistance in setting up a small leprosarium near Asmara.

As a result of the visit, the local requests were strongly indorsed as urgent steps, and suggestions were made for carrying them out as an interim program. One instructor was recommended for each of the three schools requested.

Acceptance of Proposals

From the point of view of technical cooperation, a study not followed by operations is sterile. The proposed program for Ethiopia was submitted by the Technical Cooperation Administration in Ethiopia to the Ministry of Public Health. The proposals were considered by the Central Planning Board and finally were placed before the Emperor.

As a result of the Emperor's approval, an agreement for cooperation in the field of health was signed by the Technical Cooperation Administration and the Ministry of Public Health at the end of April 1953.

What changes will come to Ethiopia and Eritrea after the proposed health programs have been put into operation remain to be seen. The study of the two countries and the recommendations which followed it are an earnest effort to help both Ethiopia and Eritrea at a strategic period in their development.

Cancer of Accessible Sites

"Half of all cancer involves sites accessible to direct examination," a new cancer control exhibit, was first shown at the annual meeting of the American Medical Association in New York City, June 1-5, 1953. Available for the use of medical societies, health departments, health associations, or any meetings of physicians, the exhibit is designed to encourage the early diagnosis of cancer. It points out to general practitioners the accessible cancer sites in both sexes and charts the percentages of all cancer occurring in these sites (see p. 975).

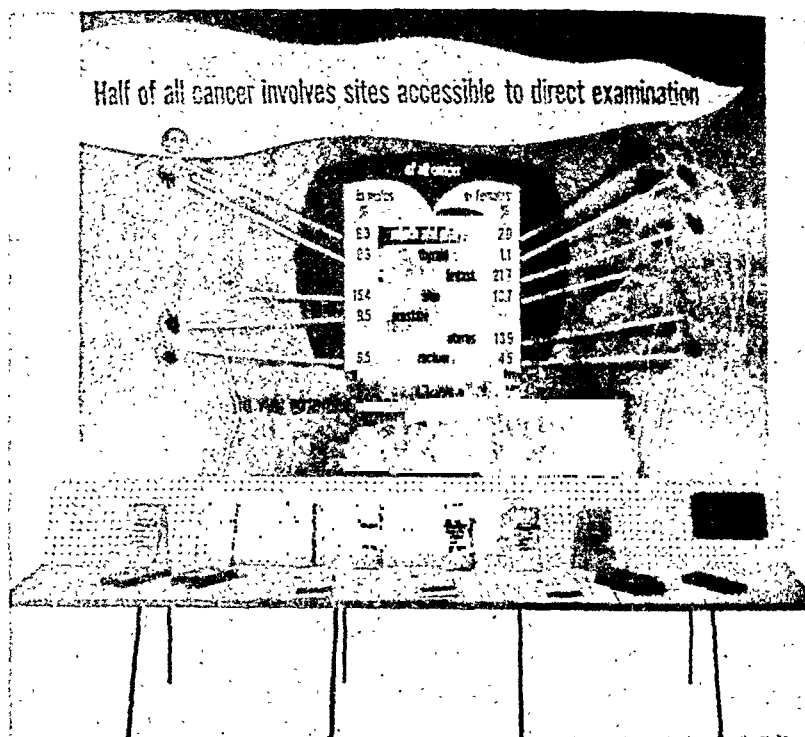
The exhibit has edge-illuminated, transparent male and female figures on a blue background. Easily assembled by one man, it has blinking lights and a shelf to accommodate publications. No transformer is necessary with a. c. current.

A threefold leaflet (Public Health Service Publication No. 324) is a facsimile of the exhibit.

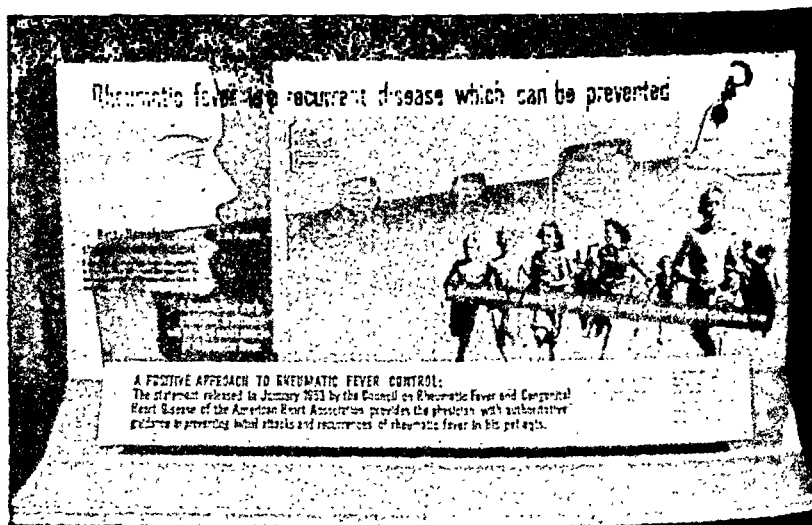
Rheumatic Fever Prevention

That "rheumatic fever is a recurrent disease which can be prevented" is stressed in an exhibit developed by the Public Health Service in cooperation with the American Heart Association. Based on the statement released in January 1953 by the Council on Rheumatic Fever and Congenital Heart Disease of the American Heart Association, the exhibit illustrates the pattern commonly observed in a typical case of rheumatic fever. It underlines the fact that year-round daily doses of sulfonamides or penicillin will prevent most recurrences of the disease.

Designed for professional audiences, the exhibit has been shown at the annual meetings of the American Academy of General Practice in St. Louis, Mo., the American Heart Association in Atlantic City, N. J., and the American Medical Association, New York.



Specifications: 1 panel 8 by 6 ft. in 2 sections; requires 8 ft. floor space and 1,000 watts a. c. Assembling instructions included with shipment. For loan, apply to: Cancer Reports Section, National Cancer Institute, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda 14, Md. Borrowers must pay insurance and shipping costs both ways. Shipping weight 560 lbs.



Specifications: 1 panel 10 by 7 ft.; requires 10 by 6 ft. floor space; one 110 volt a. c. outlet. Assembling instructions provided. For loan, apply to: Division of Chronic Disease and Tuberculosis, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C. Borrowers must pay insurance and shipping costs both ways. Shipping weight 300 lbs.

Epidemiological Study Of Plantar Warts Among School Children

By WALTER K. GRIGG, M.D.
and GERTRUDE WILHELM, R.N.

AN EPIDEMIOLOGICAL STUDY of plantar warts among children attending the public schools in Dixon, Ill., was made by the school authorities and the Lee County Health Department during the school year 1951-52. The purposes of the study were (a) to determine whether or not an epidemic of plantar warts existed, and (b) to attempt to find significant factors in the epidemiology of plantar warts so that recommendations to prevent further spread might be made.

Despite the fact that plantar warts (*verruca plantaris*) are seen frequently in the general practice of medicine, relatively little has been written about them. The term plantar wart refers to any verruca located on the plantar surface of the feet. These warts may be single or multiple, multiple warts having either a haphazard distribution or that of a large wart with satellites (mother-daughter). The usual plantar wart is a hard yellowish or grayish lesion embedded in a small or large amount of hyperkeratotic tissue. On occasion the keratotic tissue may proliferate so freely that the lesion may be thought to be a callus. A diagnosis of verruca may be made if small black dots are found where the lesion is pared. These black dots represent vascular loops in the papillae of the corium and constitute the core of the wart.

Most plantar warts are presumed to have the same etiology as warts on other parts of

the body (*verruca vulgaris*) (1). When they grow on a pressure point of the sole of the foot, however, most growth must be inward. Severe pain and disability may result, particularly if the plantar fascia is invaded. Possibly of different etiology are the mosaic plantar warts, which are flat and nonpainful and which have irregular outline. Paring of these warts reveals many individual cores, forming a pattern which leads to the term "mosaic." Mosaic plantar warts frequently occur in association with hyperhidrosis (2).

Attack Rate

The feet of all children attending the public schools in Dixon were examined at weekly intervals during the school year 1951-52 by the school nurse and physical education instructors. In a school population of 2,389 students, 107 cases of plantar warts were discovered, an attack rate of 4.47 percent. For each of the 107 cases, an epidemiology card was prepared and filled out. A statistical analysis of the information obtained from these cards is given in table 1.

As a control measure, it was necessary to determine whether the attack rate in the Dixon schools was an epidemic rate. The school children in the neighboring town of Amboy were therefore examined in May 1952. In a school population of 275, only 2 cases of plantar warts were discovered, an attack rate of 0.72 percent. The two groups being comparable, a difference of 3.75 percent between the rates represents a standard error of difference of 0.6653 percent.

Table 1. Number of cases of plantar warts and attack rate among city school children in Dixon, Ill., by school, 1951-52

School	Number of students	Number of cases	Attack rate (percent)
Loveland (grade school) . . .	128	4	3.13
Lincoln (grade school)	719	25	3.48
North Central (grade school)	469	16	3.84
South Central (grade school)	429	22	5.13
Dixon High School	644	40	6.21
All schools	2,389	107	4.47

Dr. Grigg, now in general practice of medicine in Batavia, Ill., was at the time of this study acting health officer of the Lee County Health Department, Dixon, Ill. Miss Wilhelm is the school nurse of the Dixon public schools.

Table 2. Number of cases and attack rate of plantar warts among students in grades 4 through 8, according to availability of showers

School	Number of students	Number of cases	Attack rate (percent)
Showers available			
Lincoln.....	382	22	5.76
South Central.....	217	18	8.29
Both schools.....	599	40	6.67
Showers not available			
Loveland.....	38	4	10.53
North Central.....	293	16	5.46
Both schools.....	331	21	6.04

Thus, the difference is well outside the realm of chance, and it is assumed that an epidemic of plantar warts occurred among the school children in Dixon. It is realized, of course, that a year-long survey of the children in Amboy, such as was conducted in Dixon, might have yielded a greater number of cases and a higher attack rate.

Availability of Showers

No showers were available for the students in the North Central, the Loveland, and the first three grades of the Lincoln and South Central schools. Showers were available for the remainder of the students. A comparison of the number of cases and the attack rate of plantar warts among students taking showers with the number of cases and the attack rate among students not taking showers is shown below:

	Number of students	Number of cases	Attack rate (percent)
Showers not available....	1,146	27	2.35
Showers available.....	1,243	80	6.44

The factor of age, however, must be compensated for in interpreting these figures since all students not taking showers were in grade schools, whereas the students taking showers were in both grade and high schools. Therefore, a comparison was made between the two grade schools with shower facilities and the

two grade schools without shower facilities omitting the figures for the first three grades (table 2). A ratio of 0.38 exists between the difference in the attack rates for these two groups (0.63 percent) and its standard error (1.67 percent). Thus, the difference is so small in comparison with its standard error that showers are neither implicated nor absolved as a causative factor in the epidemic.

Both the Lincoln and South Central schools use foot baths and powderboxes in their shower rooms, and all showers and shower rooms are scrubbed nightly with a strong antiseptic solution. No statement can be made as to the effect that these preventive measures had on the attack rate since there was no group in Dixon with which to compare them.

Incidence by Sex and Age

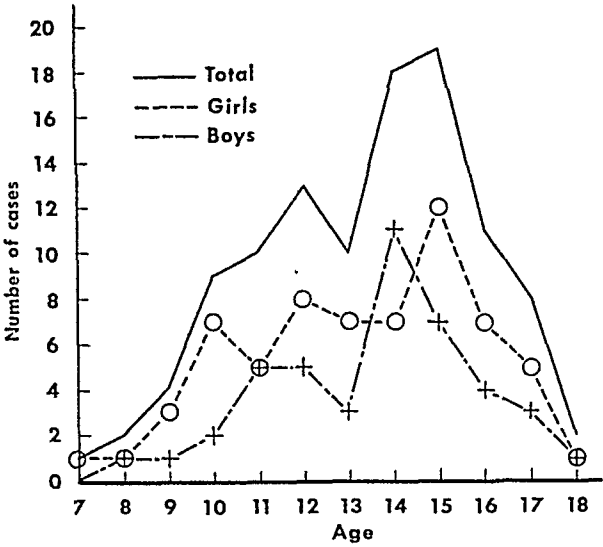
As shown in table 3, there was a higher incidence of plantar warts among girls than among boys: 59.8 percent of the cases occurred in girls. The difference between the attack rate for girls (3.48 percent) and for boys (5.55 percent), 2.07 percent, bears a ratio of 2.44 to its standard error, 0.88 percent. This difference could occur by chance only about 7.3 times in 1,000 and is therefore significant. Watkins also reported a higher incidence of plantar warts in girls, 62.9 percent (3). No reason for the higher incidence in girls has been determined.

The greatest number of cases for all students occurred at age 15; the greatest number for boys, at age 14, and for girls, at age 15 (see chart).

Table 3. Number of cases of plantar warts, by sex

School	Number of students		Number of cases	
	Boys	Girls	Boys	Girls
Dixon High School.....	303	341	16	24
Loveland.....	66	62	4	0
South Central.....	234	195	11	11
Lincoln.....	394	325	4	21
North Central.....	238	231	8	8
All schools.....	1,235	1,154	43	64

Distribution of cases of plantar warts among school children in Dixon, Ill., by sex and age, 1951-52.



The following tabulation shows the number of students observed in each grade:

Grade	Number of students
Kindergarten	271
1	177
2	161
3	234
4	180
5	184
6	171
7	173
8	170
9	213
10	188
11	150
12	117

Other Data

The number of cases of plantar warts discovered in each month of the school year 1951-52 were as follows:

Month	Number of cases
(Before July)	3
July	3
August	5
September	5
October	6
November	4
December	6
January	10
February	20
March	23
April	17
May	5

The epidemiological investigation also revealed the following data: All 107 of the students with plantar warts participated in physical education classes. Thirty-six of these students participated in interscholastic sports; 71 did not. Ninety-three of the 107 students swam in the Dixon swimming pool during the summer; 14 did not.

Incubation Period and Etiology

Investigators have attempted to determine the incubation period of verrucae vulgares through inoculation experiments on humans. They have found the incubation period to be 1 month, 3 months, 6 months, 8 months, and 20 months. The fact that material from verrucae injected into the normal skin will cause a wart to appear is presumptive evidence that warts are caused by an infectious agent, though no etiological agent has ever been isolated from a wart. Most investigators believe the agent is a virus (1).

As a part of this study a number of specimens of plantar warts were removed surgically and sent to the University of Michigan Virus Laboratory for study. All efforts to isolate a virus proved unsuccessful.

Type of Warts and Location

No mosaic plantar warts were found. Seventy-nine students had single plantar warts; 28 had multiple warts. One interesting fact was that 11 students had verrucae on other parts of their bodies. The distribution of these lesions were: hands, 7; arms, 3; and knee, 1. The incidence of verrucae on the body among the general school population was not determined. However, the fact that 10.28 percent of the children having plantar warts had verrucae on other parts of the body, 91 percent on parts that probably would come in contact with the feet, appears significant.

Ninety-three of the 107 patients had one or more verrucae located on a pressure point—base of heel, longitudinal arch, metatarsal arch, or base of toes. This figure is considered significant. Many investigators have previously presented the theory that trauma is a significant factor in the etiology of plantar warts. The locations on the feet were: metatarsal arch,

Table 4. Incidence of plantar warts among other members of the families of children having plantar warts and of control group

Group	Number of letters returned	Number of families having other members with warts	Attack rate (per-cent)
Families of children with plantar warts	30	7	23.3
Families of children without plantar warts-----	22	5	22.7

55; toes, 28; heel, 18; longitudinal arch, 6; and other parts of the foot, 11. (The total of 118 is due to the fact that some children had warts on several parts of their feet.) There were approximately an equal number of warts on the right and left feet.

Family Members Having Warts

Since plantar warts and verrucae vulgares are presumed to be infectious, the incidence of warts among other members of the family was investigated. A form letter was mailed to the parents of each student who had plantar warts, requesting that the feet and body of each family member be examined for warts. As a control measure, letters were also sent to an equal number of parents of school children not having plantar warts. The children in the control groups were of the same age and sex and in the same schools as the children with plantar warts. The results of this investigation are shown in table 4. There does not appear to be a significant difference in incidence between the families of the patients and the families of the controls.

Summary

During the school year 1951-52, 4.47 percent of the students in the Dixon public schools were discovered to have plantar warts. An examination of the school children in the neighboring town of Amboy in May 1952 revealed an attack rate of only 0.72 percent.

A comparison of schools where showers were not taken with schools where showers were taken

(and foot baths and powderboxes utilized) failed to reveal a significant difference in the attack rates.

Girls showed a higher incidence of plantar warts than boys. The greatest number of cases in boys occurred at age 14; in girls, at age 15.

The incubation period was not determined; the greatest number of cases, however, had their onset in February, March, and April.

Seventy-nine students had single plantar warts; 28 had multiple warts. Eleven of these students had verrucae on other parts of the body. The percentage of school children having verrucae on other parts of the body was not determined, but the fact that 10.28 percent of the children with plantar warts had warts on other parts of the body is considered to be significant.

Pressure points were the site of 86.7 percent of the plantar warts. Since trauma would most likely occur on a pressure point, trauma may be a factor in the development of a plantar wart, as has been suggested by many investigators.

Plantar warts are thought by the authors to be related to verrucae vulgares. Many investigators have shown that material from verrucae can be inoculated into the skin of the same person or other persons and produce verrucae, suggesting that warts are infectious. The University of Michigan Virus Laboratory was unable to isolate a virus from specimens of plantar warts sent to them during this study.

ACKNOWLEDGMENT

The assistance of the following persons is acknowledged: Dr. Charles F. Sutton, Dr. Jackson Birge, and Isabelle Crawford, Illinois Department of Public Health; Dr. Thomas Francis, Jr., and Dr. John Morley, University of Michigan School of Public Health; the principals and physical education instructors of the Dixon and Amboy public schools; and Fern Hicks, Mary Wheatland, and R. G. Thomas, Lee County Health Department.

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A Program for Protection Of Research Employees Against Pathogenic Hazards

BY JAMES BLACK, JOHN M. LYNCH, M.D.,
and IRVING LADIMER

IN THE PROCESS of investigating complex medical and biological problems, laboratory personnel become exposed to a wide variety of potentially severe hazards created by the chemical, biological, and radiological materials they handle. At the National Institutes of Health of the Public Health Service, this is true perhaps to an even greater degree than in many laboratory organizations.

Laboratory-acquired infections have been a source of danger to scientists not only because of the difficulty of safeguarding against known pathogens in small, compact work spaces but, of more importance, because of the possible presence of unknown organisms. From the early days of the Public Health Service Hygienic Laboratory down to the present extensive network of laboratory and clinical facilities at the Institutes, concern for the safety of investigators and technicians has been paramount. Laboratory hazards of this type are, of course, not unique at the National Institutes of Health (1-4), but its management and control of the problem appear worthy of report.

The National Institutes of Health was among the first of scientific institutions to develop a comprehensive program, which, following a severe outbreak of Q fever among the staff, was symbolized by the construction of a special memorial laboratory. The building, designed especially for the safe study of highly infectious diseases, physically embodies an integrated safety-health program emphasizing prevention,

control, and accurate reporting. The program operates on a quiet day-to-day basis through the efforts of the investigators who by specific instruction and exhibition of good work habits provide continuous education for the technician.

The Institutes employ about 3,000 investigators and technical aides to increase knowledge leading to prevention and cure of neoplastic, mental, cardiovascular, neurological, dental, microbiological, and metabolic diseases. The problem of safety is a continuing one of high priority. To cope with this problem, emphasis is placed on integration of physical safeguards into all the newer buildings, on observation of safe operating techniques, and on application of medical controls for all employees engaged in hazardous tasks.

Promoting "Hazard-Consciousness"

All preventive programs at the Institutes are based on the principle that the supervisor is responsible for the maintenance of a safe working environment. He is aided in this responsibility by the safety engineer, the radiological safety officer, and the medical officer of the employee health service.

The safety engineer fosters the development of a comprehensive program to create an atmosphere for hazard-awareness at all levels of employment. Each institute has its own safety committee which acts as a liaison between the laboratory chief and the employees, makes periodic inspections, and recommends safe-practice policies.

Protecting Against Pathogens

Although the safety committees of the National Institutes of Health concern themselves with all phases of safety, only the precautions used to minimize the possibility of infection from pathogenic organisms are described here.

Microbiological operating techniques necessitate a myriad of safe practices that form an integral part of procedure but which are rarely presented in the literature. Especially, for the benefit of new workers, one of the chapters of the National Institutes of Health manual, *Safe Practices*, contains a guide to safe microbiological practices, some of which,

Mr. Black is the safety officer, Dr. Lynch, the medical officer in charge of the employee health service, and Mr. Ladimer, the assistant to the director, research planning branch, at the National Institutes of Health, Public Health Service.

relating to aerosols, are outlined below. This guide consists essentially of a recording of safe techniques developed by the investigators and technicians over a period of many years.

1. All glassware containing infectious materials must be autoclaved before it is sent to the central glass wash unit. It cannot be left in the autoclave room unattended, and the can containing the glassware must bear an identification form (fig. a) showing the investigator's name and the length of time the material has been sterilized. Such equipment as broken syringes, broken glassware, or capillary pipettes that are likely to cause accidental lacerations or inoculation of the glass-room personnel should be autoclaved separately and discarded in "broken glass" receptacles.

2. Waring blenders containing infectious materials must be operated behind the closed sash of an exhaust hood (fig. b). Four vertically positioned ultraviolet lamps automatically turn on when the sash is lowered, and the exhaust chamber is provided with an electrically heated sterilizer.

A red jewel light indicates when the sterilizer element has attained its operating temperature of 700° F. Unless proper procedure directs otherwise, the blender should not be opened immediately after its operation. Other recommendations to minimize the danger of aerosol hazards are:

Modify blender to provide vaccine stopper to allow fluid to be drawn off without opening top.

Perform operation in a sterile chamber that can be decontaminated by one person in case of accident.

Provide a light plastic cover to prevent spraying of the hood chamber in the event a leak develops in the rotor bearing.

In the use of centrifuges, particularly where higher than usual speeds are involved or long periods of centrifuging are necessary, it is a good idea to make a preliminary check of the actual glass centrifuge tubes that will be used with the infectious agent.

3. When infectious material is being filtered, a trap containing an appropriate germicide should be placed between the filtering appar-

atus and the source of vacuum (fig. c). To further decrease the possibility of contamination to the vacuum line or pump and to minimize aerosol formation when the apparatus is disassembled, cotton plugs may be placed in the filter flask side arm, in the glass connecting tube between the two flasks, and in the glass tube connecting the trap with the source of vacuum. It should be set up in such a manner that the complete system can be easily autoclaved at the end of the experiment or periodically.

4. While infectious materials are being handled, the needle end of the syringe should be placed in an empty test tube to protect the technician against accidental puncture (fig. d). This technique will also minimize the possibility of contaminating the needle and will prevent droplets of infected material from contaminating work surfaces.

Syringes of the Luer-Lok type are recommended. Needles should be kept sharp, held securely and accurately in place, and oriented to prevent accidental spraying of assistant. Extreme care should be exercised during intranasal inoculations. Flame-sterilizing of the needle assembly should be done with caution to prevent cracking of the glass cylinder.

5. New workers should be made conscious of the fact that infection can be spread easily by touching equipment such as doorknobs, drinking fountains, sink faucets, and telephones, or by touching their own faces. Workers handling infectious materials should not be interrupted by the telephone. Awareness of the potential hazards involved in smoking, eating, or storing lunches in areas where infectious organisms are being handled should be stressed to the newly assigned aides.

6. The ease with which infectious aerosols can be created is also stressed in the safety manual. Aerosols can be caused when long needles of small gauge are withdrawn from tubes, setting up vibrations, or when needles are withdrawn from vaccine caps unless guarded with a wet cotton pledget (fig. e).

After flame-sterilizing a needle, the operator should hesitate momentarily before plunging a hot needle into infectious material. No solution should be prepared by bubbling expiratory air through infectious liquid, nor should



Protection against pathogenic hazards.

liquid be blown from pipettes in a manner to cause an aerosol.

Medical Examinations

The medical officer of the employee health service provides periodic physical examinations, laboratory tests, X-rays, and immunizations for those employees who are working in areas where such services are required. He is responsible for notifying the individual employee of the date on which he should report for examination. At least quarterly, the laboratory chiefs are required to provide the medical officer with a list of all personnel who are exposed to infectious organisms, and, in coordination with laboratory chiefs, the medical officer determines the type and frequency of medical control to be used.

With these data on the specific locations and nature of the various organisms, the medical

officer keeps the maintenance organization informed concerning specific hazards. The maintenance department is responsible for restricting its employees from the locations specified by the medical officer until the maintenance men have received the proper health safeguard.

Periodic chest X-rays are made of all employees exposed to infectious diseases, such as tuberculosis and histoplasmosis, that produce demonstrable pathology before outward symptoms can be detected. Employees working directly in the tuberculosis research unit receive chest X-rays at 3-month intervals, while employees with patient-contact duties in infectious and tropical disease areas of the Clinical Center at the Institutes receive chest X-rays at 6-month intervals. In addition, individuals with arrested tuberculosis and those who have had recent intimate contact with known active tuberculosis patients, are given appropriate followup chest X-rays. Employees working

with or exposed to monkeys are followed closely by chest X-ray for early signs of tuberculosis, since it is now well recognized that monkeys may act as a serious source of tuberculosis. As further protection, the monkeys themselves are tuberculin-tested when they arrive at the Institutes and at 6-month intervals thereafter; positive reactors would either be transferred to the tuberculosis research unit or be eliminated from further research projects entirely.

All employees working with or exposed in any way to infectious disease agents in their work, are urged to come to the employee health service whenever they have any illness, particularly febrile illness. Thorough evaluation and followup is conducted to determine possible relationship with the working environment. Employees who become ill at home, and who are unable to come to work, are urged to call their family physician who may call, if he desires, the employee health service or the employee's supervisor for information regarding the working environment. In any event, the ill employee is urged to report to the employee health service as soon as possible.

All employees in infectious disease areas are asked to provide a blood specimen every 6 months. The blood is frozen and stored for study and for comparison with blood taken in

future examinations. In the event of suspected occupational disease, serums are then available for diagnostic paired studies and other determinations utilizing serum.

Every 6 months, a serology test is performed to check employees working with *Brucella*. All employees directly or indirectly exposed to Q fever are immunized. Employees are encouraged to have tetanus toxoid inoculations.

In general, any applicant for employment at the National Institutes of Health with a pre-existing condition, which would make him more susceptible than the average individual to infectious diseases, would not be assigned to areas where microbiological research is being conducted.

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Grain Sanitation Committee Organized

An Advisory Committee on Grain Sanitation has been appointed by the Departments of Health, Education, and Welfare and of Agriculture to recommend a program to improve the cleanliness of wheat and to reduce economic losses caused by insects and rodents.

The work of the 17-member committee has been described by its chairman, Dr. Charles Glenn King, scientific director of the Nutrition Foundation in New York City, as a cooperative attack on the problem of grain sanitation by Government agencies, the grain, milling, and baking industries, and the agricultural colleges.

At the committee's organization meeting August 11, three subcommittees were appointed. The subcommittees and their chairmen are:

Subcommittee on Education, chairman, W. H. Bowman, representative of Millers' National Federation, Chicago.

Subcommittee on Rodent Control, chairman, Dr. Harold Macy, dean of the Institute of Agriculture, University of Minnesota.

Subcommittee on Insect Control, chairman, Dr. R. C. Smith, head of the entomology department, Kansas State College.

Frequency of Accidents as Recorded In Family Surveys

Public Health Monograph No. 14 contains three studies of accident reports based on monthly visits to the homes of families living in certain blocks of the original Eastern Health District of Baltimore.

The first study pertains to the general aspects of accident frequency. The second indicates that more accidents occur in the home than in public places or at work, but the risk of accident per million hours spent in the home is much less than the risk in public places or at work. The third study suggests that persons with chronic disease have more accidents during a specified period of observation than those who are free from such diseases.

Part I. *Accident Frequency by Specific Cause and by Nature and Site of Injury.*
By Selwyn D. Collins, Ph.D., F. Ruth Phillips, and Dorothy S. Oliver.

Annual illness of all severities and from all causes amounted in this study to 1,379 cases per 1,000 population, of which 125 (9 percent) were due to accidents. Of the 2,690 injuries in the 5-year period, 1,110 (52 per 1,000) disabled the patient for one or more days and the other 1,580 (73 per 1,000) did not cause loss of time from usual activities such as work away from or at home, housekeeping, or attending school.

In terms of total and of disabling cases, falls and miscellaneous ill-defined accidents were the 2 most frequent of 10 external causes. In terms of total accidents, lacerations, and superficial injuries were the 2 most frequent of 9 kinds of injury.

Falls are an important cause of both fatal and nonfatal accidents; motor vehicle accidents only exceed falls in fatal accidents.

The highest accident frequency occurs among children. Under 35 years of age, rates were higher for males than for females, but above 35 the reverse was true.



Public Health

MONOGRAPH

No. 14

The accompanying summary covers the principal findings presented in Public Health Monograph No. 14, published concurrently with this issue of Public Health Reports. The authors are with the Division of Public Health Methods, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Collins, Selwyn D., Phillips, F. Ruth, and Oliver, Dorothy S.: Accident frequency, place of occurrence, and relation to chronic disease. Public Health Monograph No. 14 (Public Health Service Publication No. 249). U. S. Government Printing Office, Washington, 1953.

A high proportion of all injuries involve some part of the head, particularly among children. In the ages under 5 years, head injuries occur three and five times as often among boys and girls, respectively, as the next most frequent site, hands and fingers. These injuries are mainly lacerations and superficial wounds rather than fractures.

The external cause of the accident was related to the nature and the site of the resulting injury. In nature of injury, fracture and joint injury combined was the highest category in four external causes of disabling accidents—motor vehicles, sports and recreation, falls, and miscellaneous external causes. Lacerations were highest in three external causes—falling objects, handling or striking objects, and in the use of hand tools. Lower extremity was the most frequent site of injury in five external causes—motor vehicle, sports and recreation, falls, falling objects, and other external causes; hands and fingers were the most frequent sites in three external causes—handling or striking objects, machinery, and in the use of hand tools.

All injuries of a given nature were examined to determine from which external cause they originated. Falls were either the first or second cause contributing to each of the four natures of injuries.

Part II. *Risk of Accident at Home, in Public Places, and at Work.* By Selwyn D. Collins, Ph.D.

Estimates of hours spent at home, in public places, and at work were made for the Baltimore surveyed population, with the aid of data from an intensive survey in Michigan. The observed accidents in the Baltimore group were classified by place of occurrence (home, public places, work), and accident frequency rates per million person-hours were computed for each of the three places. Such rates represent the risk of accident in each place rather than the volume of accidents.

According to the usual rates, which do not take account of the time spent in each place, home accidents in the Baltimore study were 27 percent above the simple average of accident rates in the three places; public and work accident rates were 8 and 19 percent, respectively,

below the average. When hours spent in each place are taken into account, the situation is practically reversed: the home accident rate is 41 percent below the simple average of the rates in the three places, with public-place and work accident rates 16 and 25 percent, respectively, above the average of the three rates.

Age adjusted frequency rates for all accidents per million person-hours for the ages 15 and over are lowest for home, next for public places, and highest for work accidents. Age-specific rates are reasonably consistent in indicating the same order according to the size of accident frequency rates. Children under 15 years and particularly under 5 years have extremely high frequencies of falls on sidewalks, streets, and other public places per million person-hours spent in such places. Women experience more home and public-place accidents, particularly falls, than men in the same places, but they experience fewer work accidents than men.

Rates of actual days of disability per million person-hours indicate the same general order of the results of accidents in the three places, that is, work accidents have the highest rates; public places, the next; and home, the lowest of the three.

Several indicators of the severity of accidents, such as the percentage of cases disabling for 1 day or longer, average days of disability per disabling accident, percentage of disabling accidents that had 100 or more days of disability, and the percentage of disabling accidents that were fatal, all indicate rather consistently that work accidents are generally most severe, public-place accidents next, and home accidents the least severe of the three groups.

Part III. *Relation of Chronic Disease and Socioeconomic Status to Accident Liability.* By Selwyn D. Collins, Ph.D.

This study deals with the relation of chronic disease and socioeconomic status to the frequency of accidents.

The presence of chronic disease apparently adds to the liability to accident for the individual afflicted with the disease. A consistently higher percentage of individuals who had

repeated accidents during a specified period had some chronic disease than was true of individuals who had no accidents. This statement is true not only for all chronic and all major chronic diseases combined, but is true also for important specific chronic diseases and to some extent for minor chronic diseases also.

Consideration of males and females separately shows the same relationship of chronic disease to accident frequency for each sex.

Data were available on accident frequency in relation to only a few socioeconomic factors. Annual accident frequency rates per 1,000 population and the percentage of individuals who

had repeated accidents within a given observation period were higher among manual workers of each sex than among professional-business-clerical workers.

Annual accident frequency rates per 1,000 population and the percentage of individuals who had repeated accidents within a given period were higher in the lowest income group than in the two higher income groups.

A higher percentage of individuals living in low-rent houses and of individuals living in low-value owned homes had repeated accidents than of those living in homes with higher rents or values.

Medical Research Fellowships and Grants

Awards for postdoctoral fellowships in cancer and medical research will be made in the early spring upon recommendation by the National Research Council. Applications for any of the following 1954-55 programs may be made by citizens of the United States, unless specifically noted, and must be mailed on or before December 10, 1953:

Cancer research fellowships, awarded by the American Cancer Society for study in all branches of the biological, chemical, and physical sciences and of clinical investigation applicable to the study of typical or malignant cancer growth.

Exchange fellowships in specialized cancer research, awarded by the American Cancer Society to United States citizens for advanced study in Great Britain.

Fellowships in the basic medical sciences, awarded by the Lilly Research Laboratories and to citizens of the United States and Canada by the Rockefeller Foundation.

Tuberculosis fellowships, granted by the National Tuberculosis Association to promote the development of investigators in tuberculosis-related fields. Applicants must be United States citizens who are graduates of American schools.

Support by the James Picker Foundation of candidates who propose to carry on research relating to the diagnostic aspects of radiology. Appointments are not limited to citizens of the United States.

Also, institutions may apply before January 1, 1954, for one or more grants to scholars in cancer research. A grant of \$18,000 by the American Cancer Society, payable over 3 years, will be made to each scholar's institution as a contribution toward his support, his research, or both.

The fellowships are generally limited to candidates under 35. Information and application blanks may be obtained from the National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

Trend of Multiple Cases of Poliomyelitis In Household Units

By MORRIS SIEGEL, M.D., M.P.H., and MORRIS GREENBERG, M.D., M.S.P.H.

INTEREST IN the occurrence of multiple cases of poliomyelitis in the household was stimulated by the urgent need for basic preliminary data in formulating recommendations for the use of gamma globulin in familial contacts and by the long-range objective of studying the household as a basic social unit. Epidemiological study of family units is particularly applicable to poliomyelitis because of the heavy localization of infection in affected households and the close association between host factors and the disposition to paralysis (1-3).

Investigations within the home by others have revealed the common prevalence of infection among family members at the time of or soon after the first case develops as well as the rapidity with which the virus is disseminated among household contacts (4-6). Consequently, when multiple cases do occur, they usually appear within a very short time of each other (7).

The foregoing clinical observations were confirmed in a recent epidemiological study of household infections in New York City, in which detailed data on age, time intervals, and other factors are given (8). In addition it was shown that the frequency of multiple

clinical infections in the family was related to the number of susceptible persons in the household and to the annual attack rate of poliomyelitis. The association with incidence has been further explored in the present study because of its bearing on the evaluation of passive immunization in a community control program and on the broad problem of host-agent parasitism.

The method for determining the trend in the percentage of multiple cases during the year involved the tabulation by week of onset of (a) all reported cases, (b) first cases in families that had multiple cases, and (c) subsequent cases among the latter families. The difference between items a and c reveals the total number of newly affected families. This value divided into item b gives the weekly percentage of newly affected families with multiple cases.

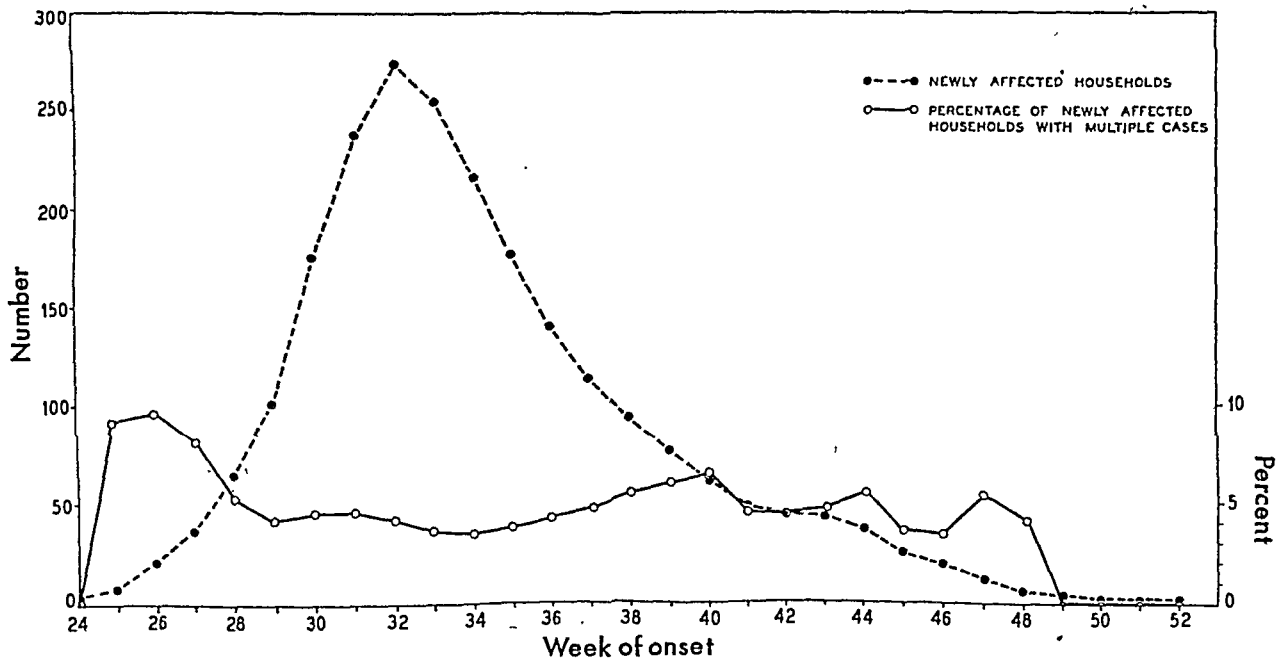
Because of the newness of the approach, the results obtained by this method of tabulation are given by week of onset in the table for 1949 and for the endemic years combined. The households with multiple cases appeared to be fairly evenly distributed during the year in proportion to the total number of families affected. This was reflected in the weekly fluctuation of percentages above or below the annual average of 4.4 for 1949 and 2.7 for 1950-1952. As expected, the weekly deviations from the annual average are usually greatest when the number of reported cases is smallest, and can be reduced by accumulating the cases over broader periods.

The Data

The conditions of the investigation have been described previously (8). The data available

Dr. Siegel is associate professor, department of environmental medicine and community health, College of Medicine, at New York City, State University of New York, and Dr. Greenberg is director of the bureau of preventable disease, New York City Department of Health, and assistant professor of epidemiology, School of Public Health, Columbia University.

Figure 1. Poliomyelitis cases in newly affected households and percentage of newly affected households with multiple cases by week of onset (3-week moving average), New York City, 1949.



were 4,886 cases of poliomyelitis reported to the New York City Department of Health from 1949 through 1952. About 61 percent were paralyzed, and 39 percent had evidence of central nervous system involvement without recognizable muscular weakness. The cases reported occurred in 4,708 households of which 167 or 3.6 percent had more than one case per household. In the endemic years of 1950, 1951, and 1952, when the incidence in the general population varied from 6.8 to 13.1 per 100,000, the percentage of affected families with multiple cases fluctuated between 2.4 and 3.0. In the 1949 outbreak, when the incidence of poliomyelitis reached 31 per 100,000 population, the frequency of multiple cases was 4.4 percent. Because of these differences in endemic and epidemic years, it was deemed desirable to study the trend of multiple cases throughout the year. The clinical and epidemiological data analyzed were obtained by medical inspectors who visited the home of every reported case as well as the hospital.

The foregoing data by week of onset are presented graphically in figures 1 and 2. The fluctuations in weekly values shown in the table were smoothed by using the conventional method of a 3-week moving average. Thus,

each value shown on the graph represents the average number of households newly affected in the weekly period before, during, and after the specific week designated in the chart.

Horizontal Trend

In the epidemic year of 1949 the number of newly affected families each week rose sharply to a peak in the 32d week ending August 12, and then declined slowly (fig. 1). However, the percentage of those developing more than one case followed a horizontal trend which was elevated only at the onset of the outbreak, then dropped to a level maintained for 20 weeks until the end of the epidemic period. Consequently, while a rise and fall in the number of affected families was occurring, the percentage of those developing more than one case remained fairly constant during the epidemic except at onset when the percentage was unduly elevated.

The results observed in the endemic years from 1950 through 1952 are given in figure 2 in terms of an annual average for the 3-year period. That is, the data from the corresponding weeks of each year were combined, as shown in the table, and the average value for each week was used as representative of the period.

Poliomyelitis cases in newly affected households and percentage of newly affected households with multiple cases by week of onset in 1949 and in 1950-1952

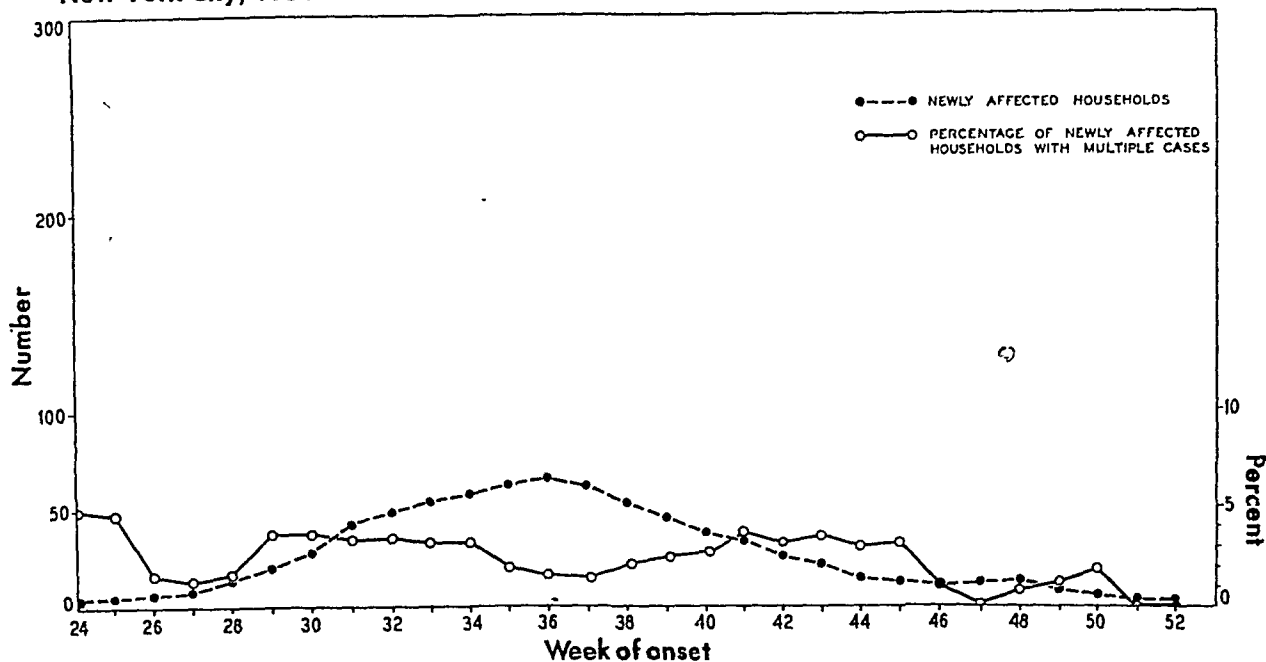
Week of onset	1949			1950-1952		
	Newly affected households	Households with multiple cases		Newly affected households	Households with multiple cases	
		Number	Percent		Number	Percent
1-22.....	8	0	0.0	64	2	3.1
23.....	3	0	0.0	9	0	0.0
24.....	2	0	0.0	11	1	9.1
25.....	7	0	0.0	20	1	5.0
26.....	13	2	15.4	10	0	0.0
27.....	44	4	9.1	25	0	0.0
28.....	54	3	5.6	38	1	2.6
29.....	97	3	3.1	54	1	1.9
30.....	151	7	4.6	91	5	5.5
31.....	280	14	5.0	114	4	3.5
32.....	286	11	3.8	165	4	2.4
33.....	257	9	3.5	158	8	5.1
34.....	225	9	4.0	159	5	3.1
35.....	173	5	2.9	186	4	2.2
36.....	139	7	5.0	201	2	1.0
37.....	107	5	4.7	191	3	1.6
38.....	86	4	4.7	154	4	2.6
39.....	85	6	7.1	128	3	2.3
40.....	62	4	6.5	122	4	3.3
41.....	40	2	5.0	99	3	3.0
42.....	44	0	0.0	90	4	4.4
43.....	49	4	8.2	54	1	1.9
44.....	32	2	6.3	47	2	4.3
45.....	31	0	0.0	28	1	3.6
46.....	16	1	6.3	20	0	0.0
47.....	13	1	7.7	39	0	0.0
48.....	7	0	0.0	40	0	0.0
49.....	5	0	0.0	27	1	3.7
50.....	4	0	0.0	17	0	0.0
51.....	3	0	0.0	3	0	0.0
52.....	3	0	0.0	6	0	0.0
Unknown.....	12	0	0.0	0	0	0.0
Total.....	2,338	103	4.4	2,370	64	2.7

In the endemic years, a slowly progressive rise and decline in the number of newly affected families occurred during the summer and fall, and the percentage of households with multiple cases followed a horizontal trend. The number of new cases did not rise to the high levels observed in the 1949 epidemic, and the percentages of affected families with multiple cases were consistently lower than in 1949. It is further to be noted that the poliomyelitis

season was again ushered in by a rise in the frequency of multiple cases above average levels as had been observed in 1949.

Thus, the percentage of households with multiple cases appears to be fairly constant during the so-called poliomyelitis season, being higher in epidemic years than in nonepidemic years. In both periods, the percentages were somewhat elevated above their respective mean values at the onset of the poliomyelitis season.

Figure 2. Average annual cases of poliomyelitis in newly affected households and percentage of newly affected households with multiple cases by week of onset (3-week moving average), New York City, 1950-52.



Discussion

This study of the seasonal trend of multiple household cases of poliomyelitis has revealed some interesting features of theoretical and practical importance. The frequency of multiple clinical infections for a given year, expressed as a percentage of households with more than one case of poliomyelitis, was established early in the poliomyelitis season and was continued at a fairly constant level throughout the year regardless of seasonal fluctuation in incidence. From this standpoint, therefore, there was no evidence of a basic alteration in host-agent parasitism in the course of the seasonal rise and fall in number of reported cases. The data suggest that virulence as measured by the capacity to induce clinical infection among household contacts was not altered by serial passage in the human host under the natural conditions that prevailed during the study.

Several points of practical importance follow as a consequence of the foregoing observations. First, there was no evidence of an alteration in epidemic pattern arising from the control measures generally employed at the time. Otherwise there should have been a reduction in the percentage of households with multiple cases.

Second, the percentage of affected households with multiple cases could serve as a useful index for measuring the efficacy of a prophylactic agent, particularly when used during one part of an epidemic or in the absence of satisfactory controls. A favorable prophylactic effect should result in a measurable reduction in the percentage of household contacts developing clinical infection.

The increase in the percentage of multiple cases in the epidemic year of 1949 as compared with the 3 endemic years that followed was observed at the onset of the poliomyelitis season and continued throughout the summer. Such an increase might be used as an early index of epidemicity. However, our experience is limited to 1 epidemic and 3 nonepidemic years. If confirmed in other studies, its value in forecasting an impending epidemic should be further explored in conjunction with other methods thought to have predictive value (9). The practical value of the method might be limited because of the low frequency of multiple cases to large population groups or to areas of inordinately high attack rates (10).

The increase in the percentage of multiple household cases observed at the onset of the poliomyelitis season in epidemic and endemic

years may be apparent only. It may represent merely a variation due to small numbers or may be due to underreporting of cases in the general population. Selective reporting of families with multiple cases might be expected, particularly at the onset of the poliomyelitis season when the population has not yet been overly alerted, and would carry more weight in calculating percentages at that time when the total number of reported cases is low than later on when the totals are high. Unusual factors affecting the host and his environment were considered but could not be related to the change. Obviously, additional data are needed before its full significance can be properly evaluated.

Summary

1. The seasonal trend of the percentage of households with multiple cases of poliomyelitis was studied in New York City from 1949 to 1952, inclusive.

2. The percentage of affected families with more than one case of poliomyelitis for a given year was maintained at a fairly constant level throughout the poliomyelitis period despite the seasonal fluctuation in incidence, but was consistently higher in the epidemic year of 1949 than in the ensuing endemic years. This difference between epidemic and endemic years was discernible from the very onset of the poliomyelitis season.

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Medical Practitioner Committee on Gamma Globulin

The Public Health Service has named a committee of seven practitioners of medicine to advise concerning the practical problems faced by the practicing physician in connection with the program of allocating gamma globulin for poliomyelitis. The group has been asked to interpret the allocation program through medical organizational channels so as to prevent misunderstanding, to evaluate the acceptability of the distribution plan, and to suggest desirable changes.

The committee held its first meeting in Washington September 10. Members are: Dr. Woodruff L. Crawford, Rockford Ill.; Dr. Edward E. Haddock, Richmond, Va.; Dr. Aims C. McGuinness of the School of Medicine, University of Pennsylvania; Dr. Herbert P. Ramsey, Washington, D. C.; Dr. A. M. Townsend, St. Louis, Mo.; Dr. Frank Wilson, director of the Washington Office of the American Medical Association; and Dr. Samuel M. Wishick of the Graduate School of Public Health, University of Pittsburgh.

National Evaluation Of Gamma Globulin

With the primary objective of measuring the effectiveness of gamma globulin in reducing the severity of paralysis in cases of poliomyelitis, a temporary National Gamma Globulin Evaluation Center has been set up within the Communicable Disease Center of the Public Health Service at Atlanta. The national evaluation center is also concerned with evaluating administrative and other phases of the national gamma globulin program. It does not distribute or administer the blood derivative. Dr. Abraham M. Lilienfeld, assistant professor of epidemiology at the Johns Hopkins University School of Hygiene and Public Health, is director of the national center.

Households where two or more cases of the disease occur are being chosen for special study, and all cases in selected epidemic areas will be investigated. Although it will be impossible to study all expected multiple case households in all States, as large a proportion as possible will be surveyed. Epidemic intelligence service officers, nurse-epidemiologists, and statisticians from the Communicable Disease Center have been assigned to the special studies. The study of multiple case households is already under way on a national basis. Epidemiological investigations in collaboration with State health departments have already been started in Alabama, Kentucky, North Carolina, Tennessee, and Virginia.

An advisory committee of 17 leading poliomyelitis authorities planned the investigation and will report on its progress. The committee is headed by Dr. Alexander D. Langmuir,

chief epidemiologist of the Communicable Disease Center, which is responsible for coordinating the national evaluation. Ten local and State health departments are represented on the committee.

Other members of the committee are Dr. John Chapman, epidemiologist, Los Angeles City Health Department; Dr. Roy F. Feemster, director, division of communicable diseases, Massachusetts Department of Public Health; Dr. D. G. Gill, State health officer, Alabama Department of Public Health; Dr. A. L. Gray, director of preventable disease control, Mississippi State Board of Health; Dr. Morris Greenberg, epidemiologist, New York City Health Department; Dr. Arthur C. Hollister, Jr., chief, bureau of acute communicable disease control, California Department of Public Health; Dr. Robert F. Korn, director, bureau of epidemiology and communicable disease control, New York State Department of Health; Dr. John D. Porterfield, director of health, Ohio Department of Health; Dr. Leonard M. Schuman, deputy director for division of preventive medicine, Illinois Department of Public Health; and Dr. Thomas F. Sellers, State health officer, Georgia Department of Public Health.

Also: Miss Lucy Blair, consultant, professional services, American Physical Therapy Association; Dr. Thomas Francis, Jr., professor of epidemiology, University of Michigan School of Public Health; Dr. William McD. Hammon, professor of epidemiology, University of Pittsburgh School of Public Health; Dr. John R. Paul, professor of preventive medicine, Yale University School of Medicine; Dr. Albert B. Sabin, director, Children's Hospital Research Foundation, Cincinnati; and Dr. Jessie Wright, medical director, D. T. Watson School of Physiatrics, Pittsburgh.

Arrangements for a muscle examination by a physical therapist of each case 50 to 70 days following onset of illness have been made with the American Physical Therapy Association, aided by a grant from the National Foundation for Infantile Paralysis. The gamma globulin is being made available by the Foundation and by the American Red Cross.

The program is sponsored by the Public Health Service in collaboration with the Association of State and Territorial Health Officers, the American Physical Therapy Association, and the D. T. Watson School of Physiatrics, which is affiliated with the University of Pittsburgh School of Medicine.

Based on material prepared by the National Gamma Globulin Evaluation Center, Communicable Disease Center, Public Health Service, Atlanta.



Organization and Administration of Bilateral Public Health Programs in Latin America

From the basic agreements which inaugurated the inter-American efforts, the evaluators traced the development of the Servicio concept and outlined its administrative characteristics. These efforts, they report, have been "directed toward developing in each country a health program best fitted to the needs of the particular country, staffed with well-trained nationals, and for which that country could eventually assume complete economic and technical responsibility."

THE RESOLUTION adopted by the foreign ministers of the 21 American Republics at their meeting in Rio de Janeiro in January 1942 recommended to the governments represented that individually or through bilateral or multilateral agreements the necessary means be taken to solve the environmental sanitation and health problems of the Americas, and that to this end each country, according to capacity, contribute raw materials, services, and funds.

Thus, it was recognized that no one nation, regardless of how favorable its economic position, could be expected to bring about any ap-

This paper and the one following are the fourth and fifth in a series of excerpts from the report of the Public Health Service's evaluation survey of 10 years of operation of the Institute of Inter-American Affairs bilateral health programs in Latin America. Introductory notes concerning the objectives and limitations of the survey, a brief summary of the history of these programs, a résumé of the criteria and methods used in evaluating them, and a discussion of the cultural problems encountered were presented in the September issue of *Public Health Reports*, pp. 829-857.

preciable change in the health conditions of the other nations by the provision of money alone. It was also recognized that the desired objectives could not be reached by any attempt by one nation to take over and run the health services of another.

The approach to the health and sanitation problems in Latin America, therefore, was to establish a program of assistance through cooperative efforts directed toward the strengthening of the existing health services of each country. This would require expansion of services and, in some cases, creation or complete rebuilding of services. All efforts of the cooperative program, therefore, have been directed toward developing in each country a health program best fitted to the needs of the particular country, staffed with well-trained nationals, and for which that country could eventually assume complete economic and technical responsibility.

Bilateral Agreements

The cooperative health and sanitation programs in each country have been inaugurated and developed through bilateral agreements. Out of the initial agreements between the

United States and Ecuador and the United States and Brazil in 1942, there evolved a pattern which generally came to be followed in all countries. Common to all programs were what came to be known as (a) the basic agreement, (b) the project agreement, and (c) the completion agreement. A summary of the chief features of these agreements follows.

Basic Agreements

The cooperative programs are initiated and extended by an exchange of notes between the United States ambassador and the foreign minister of the country involved which indicate the willingness of the respective governments to participate in a cooperative health and sanitation program. The notes authorize the minister of health and the representative of the Institute to draw up and sign an agreement stipulating the basic financial contributions and technical assistance to be contributed by each government and the general conditions under which the program will be carried out. This agreement, known as the basic agreement, is the contract between the two countries for the conduct of the cooperative program.

These agreements have taken two general forms: (a) An exchange of letters between an official of the Institute and the minister of health of the Latin American country, in which these two officials signify their agreement upon certain criteria as a basis for operating the cooperative program; or (b) a formal document drawn up and signed by the minister of health or his representative and a representative of the Institute. The latter technique came into general usage after a few years.

The provisions of the basic agreements, though varying in detail from country to country, have followed the same general pattern. The major provisions common to most agreements are as follows:

1. Provides for the establishment of a special unit of government in the host country to carry out the cooperative program. In Spanish-speaking countries this unit is usually designated as *Servicio Corporativo Interamericano de Salud Pública*, or *SCISP*. In nations where French or Portuguese is spoken, the designation is in the language of the country. The

word "*Servicio*," however, has become largely universal in usage.

2. Provides for sending to the host country a small group of United States technicians, called a field party, under the direction of a chief of field party. Most of the early agreements provided that the chief of party should be a doctor of medicine, but that provision has generally been eliminated.

3. Provides that the chief of field party will be the director of the *Servicio*.

4. Specifies the amount of money to be contributed to the cooperative program by each government and the period of time covered by the agreement.

5. Defines in some detail the area in which the program is to function, and specifies that the program is to be carried out on the basis of specific projects agreed upon in writing by the director of the *Servicio* and the minister of health or his representative.

6. Provides that the salaries and traveling expenses of the members of the field party will be paid directly by the Institute.

7. Defines the administrative authority of the director of the *Servicio* with regard to the employment of personnel, the expenditure of funds, and the accounting and reporting processes.

Thus, from the very beginning of the program in each country there has been a defined base of operation agreed to in writing by both parties. This has undoubtedly prevented many operational problems from arising and contributed immeasurably to the stability of the various programs.

The original agreements were usually brief, and some of the provisions were phrased in very general terms. As experience dictated, the agreements became more specific. In the beginning, they usually covered a period of 2 or 3 years, but after the war they were extended on a year-to-year basis. This made program planning and administration difficult, particularly since most Latin American countries operate fiscally on a calendar year and the United States appropriations usually come through long after the July 1 beginning of its fiscal year.

In 1949, Congress extended the life of the Institute to 1955, and it was possible to extend

the basic agreements for a 5-year period. The extensions covered all basic provisions except the amount of money to be contributed by the respective governments. Since this amount depends upon the appropriating bodies of the respective governments, it is necessary to amend the agreements yearly to indicate the respective contributions.

The model proposed by the Institute to be used as a basis for negotiating the 5-year extensions contained a significant statement of objectives:

"To promote and strengthen friendship and understanding between the peoples of the Republic of _____ and the United States of America and to further their general welfare;

"To facilitate public health and sanitation activities in _____ through cooperative action on the part of the parties to this agreement; and

"To stimulate and increase the interchange between the two countries of knowledge, skills and techniques in the field of public health and sanitation."

Project Agreements

The programs of the *Servicios* are carried out, for the most part, in the form of individual projects. When a particular activity is agreed upon, such as the construction of a water supply system for a village or a malaria control program for the entire country, a written plan called a project agreement is drawn up and signed by the minister or his representative and the chief of field party. This agreement defines the work to be done and allocates the necessary funds. If, because of unanticipated factors or errors of judgment, the cost of the project exceeds the original estimate, additional funds may be allocated in the same manner. The director of the *Servicio* usually has the authority to make the actual disbursement of funds within the provisions of the project agreements.

The first project to be agreed upon and signed by the respective officials in each country is known as the administrative project. It provides the funds for the establishment of the *Servicio* as a unit of government. The various administrative projects are periodically amended to provide administrative funds for continued operation and are usually terminated

only when the cooperative program is terminated.

The administrative project for Ecuador is typical. It provides funds for the salaries and traveling expenses of administrative personnel (exclusive of the United States field party), purchase of office supplies, communication expenses, purchase and repair of office furniture and equipment, rent for offices and storerooms, and other items of a general administrative nature.

Completion Agreements

As the name implies, the completion agreement is a document indicating the completion of a project. In this agreement, the minister and the chief of field party, who draw up and sign the document, agree that the work outlined in the project agreement has been completed and that the project is ready to be turned over to the appropriate governmental agency for continued operation. In many of the activities dealing with the training of personnel and perhaps the operation of certain facilities, it is impossible to draw a hard and fast line to indicate the point at which the project is finished.

The completion agreements are designed to provide a complete record of program accomplishments. Whereas the project agreement indicates the goals and plans for an undertaking, the completion agreement indicates exactly what was accomplished. These agreements, if properly maintained, provide a record of problems encountered in the course of the project operation, the techniques used to meet these problems, and the degree of success attained. The completion agreements become a history of the project and are of great value to the *Servicio* personnel in evaluating their own performance and in planning future undertakings. Likewise, they are of considerable value to the agency taking over the responsibility for the future operation of the project. Descriptions of methods which failed, as well as those which succeeded, should be recorded in these agreements to assist in future operations.

The completion agreements also provide a record of the actual expenditures made under the project agreements and any amendments. In addition to the amounts specified in the project agreements, they record any contributions made by third parties, such as municipalities,

states, private individuals, or private agencies. Such contributions may be in cash or in land, buildings, or personal services. The agreements further provide for the disposition of all property, equipment, or materials used in the development of the project.

Special Projects

An important part of the cooperative program consists of special projects which are financed completely from Institute funds and administered directly by the Institute. Special projects have been utilized in instances in which a worthy undertaking did not lend itself to bilateral action.

One of the major purposes of these projects has been the provision of scholarships and grants to Latin Americans for travel and study in the United States. Other special projects have included the translation of technical articles and books into Spanish; the furnishing of books to medical schools in Latin America; the purchase of blood plasma and its shipment to Guatemala for treatment of casualties during a revolution; the sending of sulfadiazine to Chile during an epidemic of meningitis; and the furnishing of advisory service to the Colombian Government in reorganization of the ministry of health.

Financial Contributions

The percentage of funds contributed by the United States to the cooperative health programs has varied considerably in the different countries, reflecting to some extent the economic level of the country. For example, in Venezuela the 1951 basic agreement called for a contribution of \$25,000 by the Institute and a contribution of \$502,500 by the Venezuelan Government to the basic program funds of the *Servicio*. However, the *Servicio* had a working arrangement with the Ministry whereby 75 percent of the cost of constructing water supply systems was paid by the government of the Venezuelan State in which a particular project was located. The *Servicio* contributed the other 25 percent. Therefore, on this basis the United States contributed roughly 2 percent and Venezuela contributed 98 percent of the funds.

The cost of the technical assistance supplied by the United States, however, approximated \$115,000, raising the United States contribution to approximately 8 percent and lowering Venezuela's to 92 percent.

In countries having a less favorable economic position than Venezuela, the percentage contributed by the United States has generally been much greater. For example, in Haiti, the United States contribution in money in 1951 was \$84,000 and the basic Haitian contribution was \$255,000, a ratio of 25 percent by the United States to 75 percent by Haiti. The cost to the United States for technical staff, however, was \$87,000; therefore, the United States furnished about 41 percent of the total cost of the *Servicio's* operations.

Technical Contributions

During the first years of the program, the United States contributed a high percentage of the technical and administrative knowledge and skill that went into the *Servicio* operations. The group of United States technicians, known as the field party, however, has usually numbered less than 10 people in each country. In addition to the chief of field party, who is either a physician or an engineer, the field party may include one or more of the following, depending upon program requirements: nurses, physicians, engineers, health educators, hospital administrators, industrial hygienists, and laboratory technicians. Each field party also includes a business manager, who has the responsibility for the business administrative functions of the field party and usually of the *Servicio*.

As Latin Americans acquired training and experience in the operation of the programs, the contributions of the various Latin American countries in technical skills greatly increased. On June 30, 1951, there were in all countries about 110 United States technicians in the health *Servicios* in comparison to 7,100 Latin Americans.

Third-Party Contributions

Through June 30, 1951, third-party contributions amounting to almost \$10 million had

been made to the cooperative health program. Most of these funds were contributed by local governments and local citizens groups as an inducement to secure *Servicio* assistance in some local project, such as a water supply or sewerage system, or a hospital or health center. As previously mentioned, the *Servicio* in Venezuela would not, by policy, undertake a project until a State, acting as a third party to a special project, should commit itself to contribute two-thirds of the funds.

In addition to the \$10 million contributed in funds, a conservatively estimated \$6.5 million contribution in other than cash has been made by third parties. Lack of uniformity in the reporting process among the various *Servicios* and the variety of forms which third-party contributions take make for difficulty in obtaining an accurate estimate. For example, in the construction of water supply systems in Honduras, villagers contributed their own labor to dig ditches and carried water pipe by burro. When the trails ended, they carried the pipe on their own backs over a range of mountains.

The value derived from third-party contributions is, of course, far greater than any monetary approximation would indicate. It has been well demonstrated in many countries that the monetary contributions are manifestations of the interest of the community in a project. Experience has shown that where the people of a community have had an active part in the planning, financing, and development of a facility, the chances for its continued operation at a satisfactory level of efficiency are much greater than where the people have not taken an active part.

Unfortunately, facilities have been developed by *Servicios*, perhaps upon a valid basis of need, but without sufficient attention to community understanding, encouragement of community participation, and careful evaluation of community economic status as related to financial ability necessary for maintenance.

The Servicio

The *Servicio* has come to be the trade-mark of the Institute of Inter-American Affairs. It is the administrative framework within which

the two countries which are parties to a bilateral agreement pool a portion of their economic and technical resources in order, in the case of health, to raise the health level of the host nation and promote, develop, and perpetuate a sound health program.

In most countries, the health *Servicio* is set up as a major operating division of the ministry of health. The director of the *Servicio* is on the same executive level as the directors of the other major divisions of the ministry, and organizational charts show the director of the *Servicio* reporting directly to the minister. The only exception to this pattern is in Chile, where the *Servicio* is within the National Health Service, and the administrative line runs from the director of the *Servicio* to the Director General of Health and then to the Minister of Health.

Field Party Members

Members of the field party occupy key positions in the *Servicio's* administrative structure. In all countries except Brazil, the chief of field party is the director of the *Servicio*. In some countries, other members of the field party hold administrative positions within the *Servicio* and are given official recognition by appointment by the national government; in others, by designation of the director of the *Servicio*. Although there has been no uniform definition of their administrative responsibilities with relation to the *Servicio's* national employees, the influence of the field party members on administration does not appear to have been greatly lessened by this lack.

The chief of field party as director of the *Servicio* generally has a dual administrative responsibility. As chief of field party, he is responsible for the supervision of Institute personnel in the field and for the Institute's participation in the cooperative program. As such, he is on equal footing with the minister of health in negotiating basic agreements and in determining the program to be followed by the *Servicio*. However, the chief of field party as director of the *Servicio* is subject to the administrative direction of the minister, at least theoretically, since the *Servicio* is a part of the ministry. There is a considerable variation from country to country as to how much administrative direction is given by the minister, but

in most countries it appears that the chief of field party has exercised very wide latitude in determining program content and in supervising its execution.

In Chile, the field party members, with the exception of the chief of field party, hold official positions within the *Servicio* but are designated as consultants to a national counterpart. The relative influence exerted by the different members of the field party on the administration of the program appear to depend much more on the individual's capabilities than on his official designation.

In Brazil, a national replaced the chief of field party as administrative head of the *Servicio* after the program had been in operation 2 years. The chief of field party, as the United States representative, continued to approve all expenditure of *Servicio* funds and served in an advisory capacity to the Brazilian director. As local counterparts of other members of the field party were trained to the point where they could assume the responsibility for direct program administration, the other United States technicians in Brazil also stepped aside and became consultants.

In some countries there would seem to be little justification for not training local personnel and transferring operational responsibility to them in a relatively short time. In others, because of such factors as frequent changes in government, general economic and political instability, and a scarcity of trained personnel, the process necessarily must be much slower. Every effort should be made in all countries to train local counterparts of the United States technicians, even though it may not be practicable to turn over complete administrative responsibility for some time.

Relationship to Other Ministries

Although the *Servicio* is an administrative unit of the ministry of health, some members of the field party are engaged in work as consultants to, or are closely associated with, another ministry or unit of government other than the ministry of health. For example, it is not unusual for a nurse consultant assigned to the field party to have as her primary assignment work with a school of nursing located in

the ministry of education or some other branch of government.

The *Servicio* may not only conduct a major program which involves working closely with another ministry, but it may actually be performing activities which would normally be performed by another ministry. For example, in Ecuador the *Servicio* has engaged in a large program of building water supply and sewage systems, an activity which would normally be performed by the ministry of public works. The *Servicio's* activities in that field have necessarily been closely coordinated with that ministry's activities.

It has become clear that the *Servicio* should be administratively attached to that ministry of government having the major responsibility for the field of activity for which the *Servicio* is established. In establishing *Servicios* in the field of health and sanitation in Latin America, the choice of ministries is fairly obvious, since most ministries of health have the major responsibility for public health and a substantial responsibility for hospital and institutional care. It is not unusual, however, to find education, welfare, health, and other functions in the same ministry. The *Ministerio de Previsión Social* of Ecuador, for example, has responsibility for public health, the federally administered hospitals, welfare, labor, and fire-fighting services.

It is of paramount importance that all activities of the *Servicio* be carried out in close collaboration with that unit of the national government which has the responsibility for the specific function or which will be expected to assume such responsibility at the time the *Servicio* can turn it over for local administration.

Principles of Administration

As there are great differences in the size and type of programs in the various countries, it is to be expected that organizational differences should exist. Even so, the various programs illustrate extremes both of well-organized operations with defined administrative lines of authority and responsibility and of poorly organized operations without clearly defined lines of authority and responsibility.

Proper supervision within a field party and

within a *Servicio* can be achieved only when the organizational structure is so defined that all employees have a clear understanding of their responsibility and authority, including their administrative "chain of command." It is extremely important that the chief of party give impartial and adequate supervision and con-

sultation to Institute and national personnel responsible for each type of activity. It is also important that the members of the field party keep the chief informed of developments in their programs, particularly if these developments are likely to have implications which would affect the total *Servicio* program.



10-year evaluation of the Bilateral Health Programs, Institute of Inter-American Affairs

The Servicio as an Administrative Device

EVALUATION of the *Servicio* as an administrative device for implementing the cooperative health and sanitation programs in Latin America necessarily took into account both the advantages and the disadvantages of this arrangement. No contention was made, however, that other administrative arrangements might not have served as well.

The characteristics of the *Servicio* considered advantageous include its continuous existence, its official status as an administrative unit of the host government, its large amount of freedom, from administrative controls of both the host government and the United States Government, and its stability. Thus, the *Servicio* provides an operational framework for technical assistance, facilitates the translation of plans into action, contributes to the training of nationals in technical skills, provides a base for indirect assistance to ministries other than the one in which it is established, and offers an opportunity for training nationals in general administration.

An Organizational Framework

Since the *Servicio* is an actual administrative unit of the host country, the technicians arriving from the United States have an established base of operations, with facilities for office space, clerical assistance, supplies, telephones, and related supplies and services. Of even greater importance is the fact that the *Servicios*

have existed in most countries as a stable unit of government for 10 years, thus permitting the establishment and maintenance of lines of communication and contact between *Servicio* personnel and all other officials and offices of the host government.

A large body of knowledge exists within the *Servicio* personnel regarding the operations of the host government which may affect the work of the *Servicio*. Knowledge of local protocol and of the methods and channels to be followed for the most expeditious application of the technical skills represented in the field party is preserved, even though the personnel of the field party changes.

Official Status

Opportunity for accomplishment of objectives by the field party is greatly enhanced by the official status accorded the *Servicio*. Such status opens many doors and makes available many operational facilities which otherwise would not be, at least without time-consuming negotiations.

As an official part of the national ministry, the *Servicio*, under the direction of the chief of field party, is in a position to carry out an operational program. Thus, once the minister and the chief of field party have agreed upon a program, the skills of the technical personnel may be applied to demonstrations under controlled conditions. Operational decisions may

be made largely without regard to political considerations. With the administrative direction of the program under the direct control of the technical group, it is possible to avoid many costly, time-consuming, and faulty operational decisions which are inevitable if responsibility rests with an untrained or inexperienced administrator. This factor was important in all countries early in the program and is still of paramount importance in many countries.

Special Operational Facility

In the agreements between the United States and each Latin American country in which *Servicios* have been established, there are provisions which make it possible for the *Servicios* to operate in a preferential setting. The authority of the chief of party to approve projects and put them into operation without prior clearance with the Institute makes possible the rapid translation of plans into action. At the same time, the *Servicio* is largely freed from the administrative controls and "redtape" of both the host government and the United States Government.

In many Latin American governments, procurement procedures are extremely involved. It is usually necessary to prepare a series of documents in multiple copies and to have them approved by a host of officials. More often than not, this process requires the final signature of the minister in order to procure anything from a postage stamp to a shipload of construction supplies. Many of the procurement procedures of the United States Government are only slightly less involved. The *Servicios* are in large degree freed from such procedures by the provisions of the basic agreements. As a result, they are able to secure supplies and transform work plans into action with a promptness previously unknown to most governmental agencies.

Most basic agreements also give the *Servicios* a high degree of autonomy with regard to personnel practices, accounting and recordkeeping, and other administrative activities. Thus, the *Servicio* can adopt or demonstrate the advantages of practices of the host government in fields which are appropriate.

Continuous Operation

The fact that the *Servicio* was not conceived as a short term "study and report" type of operation has proved to be advantageous in several respects. Over a period of years, the technical personnel can develop a considerable body of knowledge regarding the peculiar health problems, as well as the broad socioeconomic and political characteristics, of the particular country to which they are assigned. Because of the continuous operation of the *Servicio* in most countries, there is no break in the acquisition of this important background knowledge, and newly assigned technical staff may be readily oriented.

In the archives of Latin American government at all levels, as in the United States, are many studies and reports, perhaps well conceived and presented, which contain recommendations never put into effect. There are, of course, many reasons why sound recommendations never reach the execution stage, such as lack of adequate appropriations, an uninitiated legislative body, or opposition of interests within or without the government. But one outstanding reason is that the persons to whom the recommendations are directed often do not know how to go about initiating the changes suggested. It seems fair to conclude, therefore, that a large part of the success and popularity of the *Servicio* has been due to the fact that in actual operation it has provided dramatic demonstrations and has developed impact programs instead of making recommendations and leaving them to inexperienced, and to a large extent untrained, officials to carry out.

Characteristics of a locality often require the adaptation of tried methods—physical, social, economic, or political. Too often the technician in a survey-and-report operation is unable to perceive the adaptations necessary, with the result that the entire report is jeopardized in the minds of the local persons to whom it is directed.

In contrast, the *Servicio* operation allows the technician to make his "report" in the form of an actual demonstration project, with regional characteristics taken into account and with the collaboration of the national officials. Thus, the technician may adapt his acquired skills

and knowledges as operations dictate and submit a "final report" in the form of an operating service. Moreover, the nationals who have participated in the planning and execution of such a project are familiar with the project's goals and with its technical operation.

Training of Nationals

An important part of any technical assistance program is the providing of scholarships and travel grants for study in foreign countries. The *Servicios* utilize this practice with a high degree of success. As part of the host government, the *Servicio* is in position to evaluate the qualifications of applicants for such training. Equally as important, *Servicio* personnel are in a position to appraise in advance the opportunities that the national, once trained, will have to utilize his training in the services of his country. The *Servicio* itself provides an operating program to which many trainees return for the first application of their newly acquired skills.

In addition to contributing to the formal training program, the *Servicio* provides an opportunity for inservice training of Latin Americans. For example, when *Servicios* were established in many countries, few if any Latin American sanitary engineers were available. The *Servicio*, therefore, employed civil engineers or persons with engineering training or experience. They were given work assignments under the supervision of the field party's sanitary engineers in the design and construction of water supply and sewerage systems and on malaria control and other public health engineering projects. Thus, they received specialized training during the course of their work. The *Servicio*, by the nature of its structure and function, makes this type of training an effective contribution to the cooperative program.

A Base for Indirect Assistance

Whether a *Servicio* program is carried out as a demonstration project or as an impact program, actual operations and administrative direction rests within the *Servicio*. Therefore, technicians serving in a consultative capacity to

another ministry or unit of government may be assigned to the *Servicio* field party. By having the *Servicio* as a base of operations, such a consultant operates in a preferential setting as compared with the consultant having no previously established base of operation and lacking the official status of the *Servicio* personnel.

Since the *Servicio* functions as a part of the government of the host country and is closely associated with the operations of other branches of that government, the technicians of the *Servicio* are in a good position to judge where grants-in-aid may be made effectively. Certainly, it would appear that where the grant-in-aid is used in a technical assistance program, the guidance of on-the-spot field party personnel would be imperative.

The *Servicio*, by reason of its unusual freedom of action, is in a position to make studies and conduct research programs either as a part of its own program planning or as aid to other units of government. Such research has the advantage of intimate knowledge of the relevant factors within the country and of close cooperation between the *Servicio* and other governmental and private agencies in the country.

A Stable Base

The relative instability and frequent change of governments in some Latin American countries constitute a factor which has demanded serious consideration by both government and private industry in their relationships with these countries. The *Servicios* have proved to be a stable base of operations for the technical assistance program, subject to minimum effect by political change in the host country.

The written basic contract under which the *Servicio* operates, with its great prestige as an international agreement, has been honored without exception by all governments, whether they have come to power by election or otherwise. When there is a change in government or a change in the ministry of health, which in some countries is quite frequent, the previously agreed upon technical cooperation program continues until the new government or the new minister becomes sufficiently oriented

to plan new projects with the chief of field party. It is true that in some instances a new minister may change the emphasis of a program, but observation has led to the conclusion that changes in the chief of party have had more apparent effect upon changing the emphasis of the cooperative program than have changes in the host government. The popularity of the *Servicios*' programs have often led to the indorsement of their activities by all political factions, or at least to the elimination of their activities from discussion in political campaigns.

Training in General Administration

The opportunity which exists in the *Servicio* for the training of nationals in many aspects of general administration is one of the strong positive factors in favor of the type of administrative arrangement it represents.

Experience has clearly demonstrated that successful development of a health program cannot be accomplished by the development of skills in the field of medicine and engineering alone. Basic principles of general administration must be developed in any government before highly technical skills in such fields as health, education, or agriculture can attain the desired ends. The *Servicio* as an operating agency under the direction of, or greatly influenced by, the chief of field party offers an excellent base for demonstrating techniques in personnel administration, financial administration, procurement, and control of property, and orderly office management. Through the business manager and other members of the field party it should be possible to assist the ministries to improve their practices in these fields. This would go a long way toward assuring continued operation of *Servicio* programs at a reasonable level of competence after they are turned over to the ministries.

Problems of Responsible Administration

It is a generally recognized principle of administration that divided authority and responsibility for the operation of a program usually lead to confusion, irresponsibility, and

failure to achieve the desired results. The cooperative program by its very nature implies that the ultimate responsibility and authority for it rest with two sovereign governments. This problem has been met primarily by the delegation of authority and responsibility for program planning and operation in each country to the chiefs of field party in that country. The host governments agreed to the designation of the chiefs of field party as the directors of the *Servicios*, and in practice they have delegated practically complete operational responsibility to them. Thus, the chief of field party of each *Servicio* may put a program into action when he obtains the concurrence of the minister of health on specific projects, so long as it falls within the general framework of the bilateral agreement. Although project agreements do not require prior approval by the Institute, they are reviewed by it for form and legal commitments which may be involved.

The mere delegation of authority to the chiefs of field party does not completely solve the problem of dual responsibility, although it has unquestionably done much to facilitate operations.

The chief of field party has considerable prestige in most of the Latin American countries. He is an official representative of the United States Government. In some cases his salary is higher than that of the highest paid national government official. He has a considerable budget at his disposal, with few of the checks and controls imposed upon other operating officials in either country. In some countries, because the *Servicio* has demonstrated comparatively high efficiency, it has been asked to assume the role of purchasing and importing agent for other sections of the host government. This activity requires the handling of considerable sums of money in addition to the *Servicio* funds and not subject to the same control and audit as are the *Servicio* funds.

All these factors make it clearly impractical for the Institute to delegate completely its responsibility for the *Servicio*'s operations and necessitate a bifurcated administration by the two governments involved. They also emphasize the absolute necessity of having outstanding administrators as chiefs of field party.

Inherent in the administration of the *Ser-*

vicios is the danger that they will develop into governmental institutions interested in self-perpetuation and lose sight of the fact that their existence is solely for the purpose of assisting a national government in strengthening existing units of government or in developing new units, all of which are to be fitted eventually into a unified and harmonious national governmental operation in a particular field of endeavor. Since the *Servicio* operates in a pref-

erential setting, it is much easier for it to develop and maintain specific health services at a high level of efficiency than it is for most units of a national government. Because of an understandable pride of accomplishment and a reluctance to see the developed services undergo any unfavorable change, there has been a tendency to continue the programs and facilities under the auspices of the *Servicio* for longer periods than would appear to be desirable.

In considering the advantages and disadvantages of the Servicio as an administrative device, the evaluators reached the conclusion that, although full use has not been made of its positive administrative potential, not many of the negative possibilities have materialized to an extent to cause serious concern regarding the technique. They agreed that over a period of

years the Servicio has worked, and worked well, and that the programs undertaken through this type of organization have been unquestionably highly successful. They concurred in the view that certainly no other type of administrative organization has been as thoroughly tested over such a period of time and in such a setting and found to be so successful.

United Nations Day

October 24 has been designated as United Nations Day by Presidential proclamation.

President Eisenhower urged the citizens of the Nation to observe the day by "sending messages to friends, relatives, and associates in other member countries of the United Nations, by learning more about the United Nations and its members, and by expressing their confidence in the United Nations, their friendship for other peoples, and their faith in the ultimate triumph of peace and justice through the efforts of men of good will."

He also called upon "officials of the Federal, State, and local governments, the United States Committee for United Nations Day, representatives of civic, educational, and religious organizations, agencies of the press, radio, television, motion pictures, and other communications media, and all citizens to cooperate in appropriate observance of this day throughout the country."

The proclamation pointed out that the United Nations provides the peoples of the world with an organization through which international differences in the economic and political fields can be peacefully resolved; that the need for the United Nations is greater than ever before, and that its success depends on the extent to which its members give it support.

1952 Provisional Data Indicates Decline In Tuberculosis Mortality

In 1952 in the continental United States, there were an estimated 25,080 tuberculosis deaths, or 16.1 per 100,000 population, according to 10-percent sample tabulations by the National Office of Vital Statistics. State health department provisional tabulations are usually slightly lower and in 1952, as reported to the Division of Chronic Disease and Tuberculosis on the Annual Tuberculosis Report, give a total of 24,195 deaths, a rate of 15.5.

Prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.

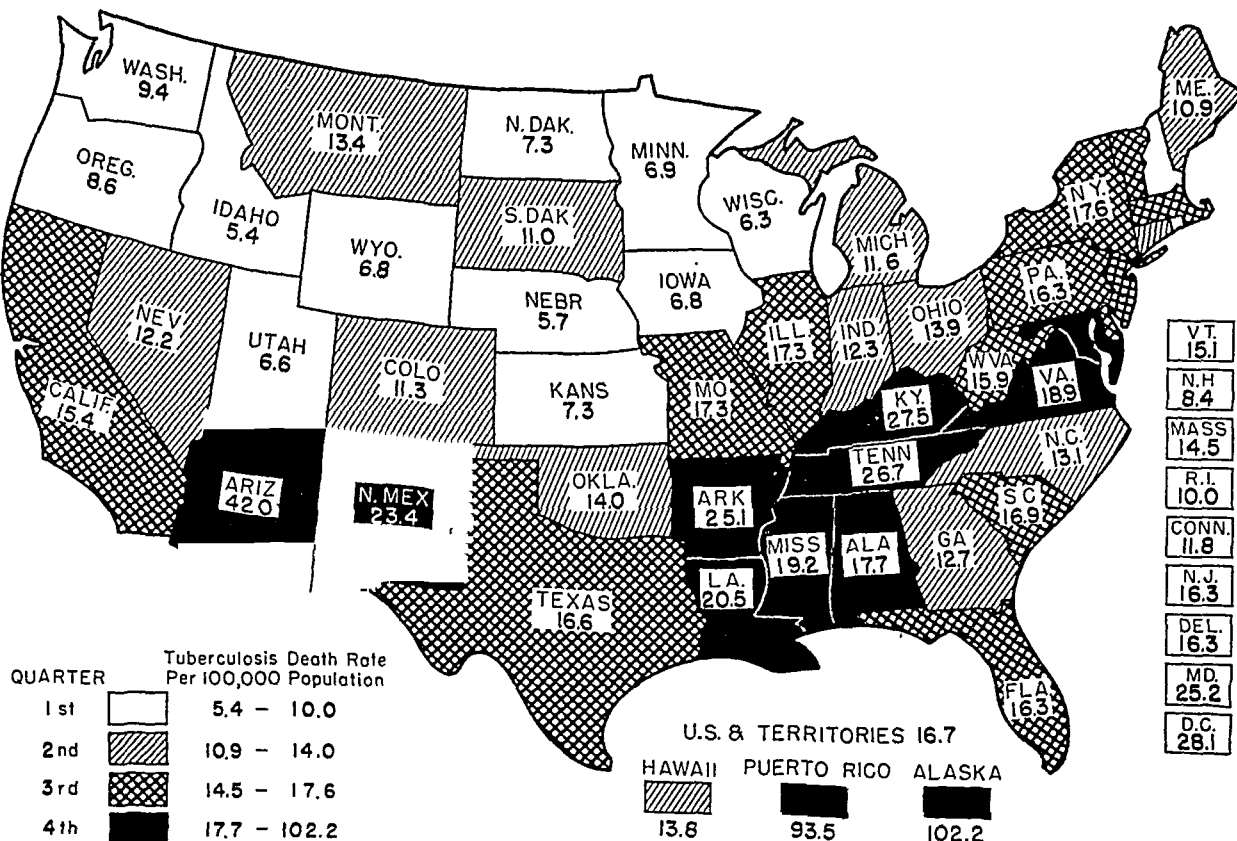
Thus, these two provisional figures, while not identical, are in agreement that there was a decline of approximately 30 percent in the tuberculosis death rate from 1950 to 1952.

Even though tuberculosis mortality is not by itself a realistic measure of the extent of the problem, it is still of general concern and serves to illustrate the progress made in an important aspect of tuberculosis control.

Twelve States had tuberculosis death rates in 1952 of less than 10, while 7 States, the District of Columbia, Puerto Rico, and Alaska had rates in excess of 20 (see map).

The cities with a population of 100,000 and over as a group had a provisional tuberculosis death rate of 22.4, or more than 70 percent higher than the death rate for the remainder of the country. (This does not include 6 States for which rates for their larger cities are not yet available.) Higher death rates in some of the States are partly due to the presence of highly urbanized areas.

Tuberculosis death rates in the United States and Territories, 1952, provisional data.



Source: Annual Tuberculosis Reports (PHS-1393 Rev. 1-52)

New York State, exclusive of cities of 100,000 population and over, has a tuberculosis death rate of only 10.7. Michigan, exclusive of the large cities, had a rate of 7.7, and Minnesota, exclusive of the large cities, had a rate of 5.1 per 100,000 population in 1952. However, even with the low rates which result when the cities over 100,000 population are removed

from consideration, there were in the remainder of the continental United States in 1952 more than 13,000 tuberculosis deaths.

Tremendous progress has been made in the reduction of the tuberculosis death rate. It is hoped that within the next few years similar progress can be made in reducing the number of new tuberculosis cases.

To the Professional Public Health Worker

You, like the specialist in medical and other fields of science, know how important it is to be informed on current knowledge in your specialty. And, for the most part, you rely on the first-hand availability of the leading journals and periodicals in your specialty.

But as more becomes known of public health practice and research, the more complex this science becomes. There comes too the need to relate the activities of all its component disciplines—the members of the family of public health—one to the other, and each to the whole. And for each specialist there is a need to read regularly the journals devoted to unifying the family of public health. *Public Health Reports* is such a journal.

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Milk Sanitation Honor Roll for 1951-53

Seventy communities have been added to the Public Health Service milk sanitation "honor roll" and 42 communities on the previous list have been dropped. This revision covers the period from July 1, 1951, to June 30, 1953, and includes a total of 261 cities and 62 counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation contained in the Milk Ordinance and Code recommended by the United States Public Health Service. The State milk sanitation authorities concerned report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk is sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 400 counties and 1,558 municipalities. The ordinance also serves as the basis for the regulations of 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, April 1953, pp. 445-448. The rating method was described in Public Health Reports 53: 1386 (1938), Reprint No. 1970.

communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

The rules for inclusion of a community on the "honor roll" are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service milk ordinance. (A departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included

in the list unless both its pasteurized milk and its retail raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the retail raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns," it is suggested that when the rating of a community on the list falls below 90 percent, no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk control district, or the State. (In the absence of such an official program there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary period shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

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Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1951-June 1953

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Alabama</i>		<i>Indiana—Continued</i>		<i>Mississippi</i>	
Auburn.....	9-19-1951	Evansville.....	10-1-1951	Aberdeen.....	10-26-1951
Birmingham-Jefferson County.....	7-26-1952	Fort Wayne.....	10-1-1952	Amory.....	10-25-1951
Gadsden-Etowah County.....	8-8-1952	Indianapolis.....	10-31-1952	Belmont.....	7-12-1951
Montgomery.....	5-22-1952	Kokomo.....	2-11-1953	Booneville.....	9-28-1951
Opelika.....	6-19-1952	Madison.....	7-1-1952	Brookhaven.....	3-11-1952
<i>Arkansas</i>		Marion and Gas City..	12-1-1952	Canton.....	10-1-1952
Fort Smith.....	10-18-1952	Mount Vernon.....	1-16-1953	Clarksdale.....	9-25-1952
<i>Colorado</i>		Muncie.....	1-28-1953	Cleveland.....	9-3-1952
Denver City and County.....	11-27-1952	New Castle.....	2-1-1953	Columbia.....	7-17-1952
Grand Junction.....	4-25-1952	Peru.....	8-27-1952	Columbus.....	8-13-1951
Pueblo.....	8-1-1951	Richmond.....	5-15-1953	Eupora.....	3-28-1952
Weld County.....	4-11-1952	Rushville.....	8-1-1951	Greenville.....	8-25-1952
<i>Florida</i>		Shelbyville.....	8-1-1952	Greenwood.....	4-15-1952
Pinellas County.....	1-29-1953	South Bend.....	8-14-1951	Grenada.....	1-22-1952
<i>Georgia</i>		Valparaiso.....	7-31-1952	Iuka.....	7-12-1951
Albany.....	5-28-1953	<i>Iowa</i>		Kosciusko.....	1-31-1952
Athens.....	4-16-1953	Des Moines.....	7-1-1951	Louisville.....	10-4-1951
Atlanta.....	11-21-1951	Dubuque.....	11-14-1952	Macon.....	6-12-1952
Cairo.....	12-18-1952	Marshalltown.....	1-29-1953	McComb.....	10-25-1951
Camilla.....	11-18-1952	Mason City.....	10-3-1953	Meridian.....	6-18-1952
Columbus.....	2-23-1953	<i>Kansas</i>		Morton.....	6-17-1952
La Grange.....	3-18-1953	Dodge City.....	4-20-1953	Natchez.....	12-17-1952
Quitman.....	4-9-1953	Hillsboro.....	11-7-1952	New Albany.....	1-7-1952
Savannah.....	8-15-1952	<i>Kentucky</i>		Ruleville.....	4-13-1952
Tifton.....	6-18-1953	Bowling Green.....	4-17-1952	Starkville.....	11-27-1951
Valdosta.....	3-13-1952	Calloway County.....	2-15-1952	State College.....	11-27-1951
Waycross.....	10-23-1951	Campbell County.....		Tupelo.....	4-8-1953
<i>Illinois</i>		Newport.....	11-28-1951	Vicksburg.....	6-13-1952
Chicago.....	8-1-1951	Central City and Muhlenberg County	4-1-1952	Winona.....	1-24-1952
<i>Indiana</i>		Christian County.....	12-20-1951	<i>Missouri</i>	
Bedford-Orleans.....	10-1-1952	Fulton County.....	7-23-1952	Cape Girardeau.....	3-15-1952
Berne.....	3-1-1953	Louisville and Jeffer- son County.....	5-23-1952	Jackson.....	3-15-1952
Bloomington.....	11-26-1952	Owensboro and Daviess County.....	8-6-1952	Kansas City.....	12-1-1952
Bluffton.....	3-6-1953	Owenton and Owen County.....	4-2-1953	Lebanon.....	2-13-1953
Cooperative Grade A Milk Program.....	9-1-1952	Pendleton County.....	4-2-1953	North Kansas City...	12-1-1952
Holland.....		Warren County.....	4-17-1952	Springfield.....	2-13-1953
Huntingburg.....		Williamstown and Grant County.....	4-2-1953	Warrensburg.....	12-1-1952
Jasper.....		<i>Louisiana</i>		<i>Nebraska</i>	
Crawfordsville.....	2-28-1953	New Orleans.....	12-6-1951	Grand Island.....	9-18-1952
Elkhart.....	11-1-1952	St. Martin Parish.....	5-23-1952	<i>Nevada</i>	
		Vermilion Parish.....	9-9-1951	Yerington.....	12-5-1951
				<i>North Carolina</i>	
				Alleghany County...	9-10-1952
				Charlotte.....	1-11-1952
				Craven County.....	11-21-1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1951-June 1953—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>North Carolina—Continued</i>		<i>Tennessee—Continued</i>		<i>Texas—Continued</i>	
Cumberland County..	2-15-1952	Kingsport.....	10-23-1951	Texarkana.....	7- 2-1952
Davie County.....	10- 1-1952	Knoxville.....	8-22-1951	Texas City.....	1-20-1953
Durham County.....	7-18-1952	Lebanon.....	8- 1-1952	Tyler.....	2-10-1953
Edgecombe County		Lewisburg.....	6-12-1952	Victoria.....	7-24-1952
(excluding Rocky		Loudon.....	4- 3-1952	Waxahachie.....	9-30-1952
Mount).....	7-16-1952	Manchester.....	10-17-1952	Weslaco.....	8-24-1951
Forsyth County.....	7-16-1952	Morristown.....	9-25-1951	Wichita Falls.....	3-20-1953
Guilford County.....	8- 6-1952	Nashville and David-	11- 5-1951		
Henderson County....	2- 5-1952	son County.			
Iredell County.....	10-25-1952	Newbern.....	10-23-1952	<i>Utah</i>	
Jackson County.....	1-17-1952	Newport.....	9-18-1951	Logan.....	5-14-1952
Lincoln County.....	3-19-1952	Rogersville.....	4-21-1952	Ogden.....	12-11-1951
Mars Hill.....	1- 4-1952	Shelbyville.....	6-11-1952	Salt Lake City.....	4-29-1952
Mitchell County.....	8-10-1951	Sweetwater.....	9-16-1952		
New Hanover County..	6-10-1952	Tullahoma.....	10-17-1952	<i>Virginia</i>	
Orange County.....	7- 3-1952	Winchester.....	10-17-1952	Abingdon.....	10-19-1951
Person County.....	3-17-1953			Blacksburg.....	8- 7-1952
Pitt County.....	1-27-1953			Bristol.....	10-19-1951
Swain County.....	1-17-1952	<i>Texas</i>		Front Royal.....	8-29-1951
Transylvania County..	2- 5-1952	Bryan.....	6-28-1952	Luray.....	8-29-1951
Yadkin County.....	10- 1-1952	College Station.....	6-28-1952	Narrows.....	8- 8-1952
Yancey County.....	8-10-1951	Commerce.....	9- 2-1952	Norfolk.....	9- 5-1952
		Corpus Christi.....	9-27-1952	Pearisburg.....	8- 8-1952
		Corsicana.....	8- 6-1952	Pulaski.....	8- 7-1952
<i>South Dakota</i>		Dallas.....	1- 8-1953	Radford.....	8- 7-1952
Sioux Falls.....	10-25-1952	El Paso.....	10-21-1952	Richmond.....	5-21-1952
Vermillion.....	6-12-1952	Galveston.....	12-11-1951	Roanoke.....	9-19-1952
		Gladewater.....	7-26-1952	Staunton.....	11- 7-1952
<i>Tennessee</i>		Harlingen.....	8- 4-1951	Suffolk.....	9-26-1952
Athens.....	7-16-1952	Houston.....	6-11-1952	Waynesboro.....	8- 3-1951
Bristol.....	10-19-1951	Kerrville.....	7-31-1952		
Chattanooga.....	11-13-1952	Kilgore.....	7-26-1952	<i>Washington</i>	
Clarksville.....	1-30-1953	La Feria.....	8- 2-1951	Cowlitz County.....	10-12-1951
Cleveland.....	10- 1-1952	Lufkin.....	10- 8-1951	Spokane.....	9-25-1952
Clinton.....	11-28-1951	McKinney.....	2-17-1953	Whitman County.....	6-19-1952
Columbia.....	5-22-1952	Mercedes.....	8-21-1951		
Cookeville.....	11-14-1951	Mineral Wells.....	2-11-1953	<i>Wisconsin</i>	
Covington.....	10-22-1952	Mission.....	8-24-1951	Beaver Dam.....	2-27-1953
Cowan.....	10-17-1952	Mt. Pleasant.....	9-24-1952	Burlington.....	3-26-1953
Dandridge.....	9-17-1951	Nacogdoches.....	9-20-1952	Delavan.....	3-26-1953
Decherd.....	10-17-1952	Orange.....	1- 6-1952	Eau Claire.....	3- 5-1953
Dyersburg.....	10-23-1952	Pharr.....	8-22-1951	Elkhorn.....	3-26-1953
Erwin.....	10-15-1951	Port Arthur.....	10-17-1951	Fontana.....	3-26-1953
Franklin.....	6- 6-1952	San Antonio.....	11-20-1951	Lake Geneva.....	3-26-1953
Greeneville.....	4-17-1952	San Benito.....	8- 1-1951	Madison.....	10- 5-1951
Jefferson City.....	9-25-1951	San Juan.....	8-23-1951	Ripon.....	2-27-1953
Johnson City.....	8-27-1952	Sweetwater.....	2- 4-1953	Waupun.....	2-27-1953
				Williams Bay.....	3-26-1953

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1951-June 1953—Con.

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating	Community and percent of milk pasteurized	Date of rating
<i>Alabama</i>		<i>Louisiana</i>		<i>Tennessee</i>	
Clanton, 87.2-----	5-12-1952	Iberia Parish, 94.4----	6----1952	Alcoa, 99.5-----	9-17-1952
Huntsville, 98-----	8-10-1951	Shreveport, 99.9-----	8----1952	Elizabethton, 93.6----	11-25-1953
Lanett, 97.8-----	11- 6-1952			Harriman, 90.6-----	7-26-1951
		<i>Mississippi</i>		Maryville, 99.5-----	9-17-1952
<i>Arkansas</i>		Gulfport, 98-----	4-30-1952	McMinnville, 95.3----	5- 7-1952
Little Rock, 99.3-----	4-20-1953	Hattiesburg, 96-----	7-31-1952	Murfreesboro, 98.7----	7- 6-1951
		Jackson, 98.6-----	9-11-1952	Ripley, 96.9-----	10-22-1952
<i>Florida</i>		Laurel, 93.6-----	8-13-1952		
Dade County, 99.99---	1- 8-1953	West Point, 97.6-----	7-18-1951	<i>Texas</i>	
				Austin, 97.3-----	10-24-1951
<i>Georgia</i>		<i>Montana</i>		Beaumont, 99.9-----	8-15-1952
Brunswick-Glynn		Missoula, 99.4-----	9----1952	Brenham, 94.9-----	7-26-1951
County, 96-----	11- 6-1952			Brownsville, 92.7-----	8- 1-1951
Carrollton, 94.2-----	3-14-1952	<i>North Carolina</i>		Childress, 87-----	2- 4-1953
Cartersville, 97-----	12-11-1952	Ashe County, 78.7----	9- 9-1952	Cleburne, 95.5-----	7-31-1952
Cedartown, 98.3-----	3-11-1952	Cabarrus County, 80.3.	1-15-1952	Edinburg, 93.8-----	8-28-1951
Gainesville-Hall		Caldwell County, 88.7.	10-29-1951	Fort Worth, 99.97----	2-12-1952
County, 93.1-----	3-21-1952	Halifax County, 83.4--	4-10-1952	Gilmer, 94.4-----	1-29-1952
Newnan, 94.7-----	6- 5-1952	Kings Mountain, 83.8.	8-18-1952	Greenville, 98-----	9-27-1952
Pelham, 88.8-----	11-18-1952	Lenoir County, 78.4--	1-30-1953	Henderson, 94-----	1-31-1952
Thomaston, 81.7-----	4-30-1952	Macon County, 91.5--	11- 7-1952	Laredo, 80-----	9-18-1952
Winder, 97.9-----	1-23-1953	Polk County, 87.5----	6-18-1952	Longview, 99.4-----	7-26-1952
		Robeson County, 96.6.	2-15-1952	Lubbock, 99-----	8-25-1952
		Shelby, 74.4-----	6- 6-1952	Marshall, 87.2-----	10- 3-1952
		Wake County, 99.3--	3- 4-1953	McAllen, 99-----	8-22-1951
		Wilkes County, 90.6--	9-20-1951	Palestine, 88.8-----	1-15-1952
				Paris, 92.3-----	9-26-1951
<i>Indiana</i>				Sherman, 93.3-----	11- 6-1951
Michigan City, 98.1---	7----1951				
		<i>Oklahoma</i>		<i>Virginia</i>	
<i>Kansas</i>		Elk City, 99-----	4-17-1953	Harrisonburg, 96-----	11-12-1952
Pittsburg, 98-----	11- 7-1952	Stillwater, 98-----	4-29-1953		
				<i>Washington</i>	
<i>Kentucky</i>		<i>Oregon</i>		Tacoma, 99.7-----	8-13-1952
Lexington and Fayette		Salem, 99.7-----	7-15-1952		
County, 97-----	4-28-1952			<i>West Virginia</i>	
Princeton and Caldwell		<i>South Carolina</i>		Clay County, 88-----	9-16-1952
County, 94.7-----	6----1953	Spartanburg and Spar-		Kanawha County, 96--	6- 6-1952
Somerset, 91-----	2----1953	tanburg County, 91.3.	10-31-1951	Nicholas County, 55--	9-18-1952

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90-percent or more compli-

ance with the grade A raw milk requirements of the Milk Ordinance and Code recommended by the United States Public Health Service.

Note particularly the percentage of the milk pasteurized in the va-

rious communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized, either commercially or at home, before it is consumed.

publications

The Genera of the Homobasidiomycetes

U. S. Department of Agriculture, Division of Mycology and Disease Survey, Special Publication No. 3. 1953. By William Bridge Cooke. Limited edition, available on request to the Bureau of Plant Industry, Beltsville, Md. 100 pages.

This current listing of the genera of higher fungi gives 1,521 generic names of the polypores and overlapping groups and is intended as a reference for persons working with the higher fungi. Listed are the wood rotting fungi, such as dry rot; mushrooms and toadstools, including soil fungi and mycorrhiza formers whose fruit bodies may be poisonous or edible; and some plant pathogens. The compilation, arranged alphabetically, brings together for the first time widely scattered information found in private files, in technical publications, in published reviews, and in other relatively inaccessible places. The gastromycetes are not included in the compilation.

William Bridge Cooke is the compiler of the list. He is now a mycologist with the Environmental Health Center of the Public Health Service at Cincinnati and formerly a research associate in mycology at the State College of Washington, Pullman, Wash.

Individual Water Supply Systems

Public Health Service Publication No. 24. Revised 1950. Reissued 1953. 61 pages; illustrated. 25 cents.

Because of the accelerated rate of housing construction and the subsequently aggravated environmental health problems, especially in rural communities, the Joint Committee on Rural Sanitation has prepared these recommendations to establish a uni-

form approach for various Federal agencies concerned with the sanitation of individual water supplies.

Limited to the sanitation aspects of small water supplies used by one or possibly several families and by rural schools, recreational areas, and camps, the recommendations are applicable to newly developed supplies, alterations or extensions to existing supplies to eliminate sanitary defects, and maintenance of special vigilance on all questionable conditions until adequate corrections have been made.

The recommendations cover basic requirements, water-supply development of ground waters and surface waters, water purification, and pumping, distribution, and storage. Appendixes include recommended procedures for cement grouting of wells and for disinfection of wells. A bibliography on individual water supply systems is also given.

Typical Architectural Program for a General Hospital

Public Health Service Publication No. 322. 1953. 23 pages. A limited number of individual copies are available on request to the Division of Hospital Facilities, Public Health Service, Washington 25, D. C.

This publication is intended to serve as a guide in the development of architectural programs for the design and construction of hospital buildings. Such programs should be prepared through the cooperative efforts of the hospital board, administrator and staff, hospital consultant, and others concerned, and contain, in reasonable detail, the information which is vital to the architect before starting the drawings.

By presenting the type of information required in a usable format, this

pamphlet will, it is hoped, stimulate the preparation of adequate architectural programs, the scarcity of which has proved to be a considerable handicap to good hospital planning.

Outpatient Departments For 50-, 100-, and 200-Bed General Hospitals

Public Health Service Publication No. 318. 1953. 14 pages; illustrated. Available on request to the Division of Hospital Facilities, Public Health Service, Washington 25, D. C.

This brochure is a compilation of material from Elements of the General Hospital and other publications of the Division of Hospital Facilities. It is intended to serve as a ready reference until more detailed studies relating to outpatient facilities are completed.

The brochure describes the requirements and functional design relationships of the various component sections of the outpatient department of the 50-, 100-, and 200-bed general hospital. Floor plans and discussion regarding waiting-room areas, information, appointment, medical records, social service, examination and treatment rooms, drug dispensary, and a dental suite are presented.

The Child With a Cleft Palate

Children's Bureau Folder No. 37. 1953. 13 pages; illustrated. 10 cents.

One baby in every 1,000 is born with a cleft palate. That baby now has a better chance of overcoming this handicap than has been true in the past because of increased understanding of the problem and better means and increased skill in the treatment of the cleft palate.

This Children's Bureau publication, another in a series of pamphlets designed to help parents who have a child with a handicapping condition, outlines different ways of

treating cleft palate, tells what special care is needed, underlines the importance of early speech training, and tells where parents can go for help in their community.

Emphasis is placed on the fact that cleft palate is not a hopeless handicap and that thousands of men and women born with a cleft palate have become business leaders or hold responsible, well-paying professional jobs. With understanding and proper guidance any child with a cleft palate has every chance to develop into a useful, happy, and successful adult.

Health Status and Services, January 1952. Economic Base Study, Arkansas-White-Red River Basins

Public Health Service Publication No. 313. Health, Housing, Education and Recreation Series, part VI, section 1. 1953. By Rollo H. Britten and Maryland Y. Pennell. 101 pages; tables, maps. Available on request to the Division of Engineering Resources, Public Health Service, Washington 25, D. C.

Authorized by the Flood Control Act of 1950, the Arkansas-White-Red River Basin Interagency Committee determined that a comprehensive economic base survey should be made to serve as a guide for the future development of this river basin area. Intended to establish the developed and undeveloped natural resources in the area, the survey is divided into 10 parts: population; labor force and employment; income; chief patterns of economic activity; natural resources; health, housing, education, and recreation; opportunities for development; economic history of the area; special reports series; and future economic development and programs for achievement. Various Federal agencies were assigned to

prepare the several parts of the report, the Department of Health, Education, and Welfare being responsible for the survey of health, housing, and recreation.

This publication contains statistics on the sickness and mortality rates, and the adequacy of medical and related services and facilities for the eight State sections and for various geographic subdivisions of the area included in the Arkansas-White-Red River Basin. The survey reveals that mortality rates from all causes are the highest for the New Mexico and Louisiana State sections and lowest for Kansas, the Texas Panhandle, and western Oklahoma. Mortality rates for tuberculosis are highest for Arkansas, Missouri, and New Mexico. The basin presents a few areas of high infant mortality, especially in the New Mexico and Colorado State section; maternal mortality rates are high in Arkansas, Louisiana, New Mexico, and eastern Oklahoma. The areas of greatest incidence of typhoid fever are mostly in the eastern and southern parts of the basin.

Health manpower is at a low level in the basin. It is about two-thirds that of the country as a whole for each of four types of personnel—physicians, dentists, nurses, and sanitary engineers. The number of general hospital beds in relation to the population is less in this area than in the country as a whole—2.9 per 1,000 persons in the basin, 3.6 in the United States. Only half of the counties have full-time local health units, but 72 percent of the basin population is served.

In terms of healthfulness of the area and the facilities available for the maintenance of health, as discussed in the report, the outstanding areas of the basin are Kansas, the Texas Panhandle, Colorado, and the western and central parts of Oklahoma.

Handbook on Sanitation of Vessel Watering Points

Public Health Service Publication No. 274. 1953. 12 pages; illustrated. Available on request to the Division of Sanitation, Public Health Service, Washington 25, D. C.

Important in the health protection of passengers and crew members aboard vessels is the provision of safe water for drinking and culinary purposes. This handbook is intended to serve as a guide for those who are charged with the design, construction, or operation of facilities on wharves and piers for loading potable water on vessels, and for the personnel of the Public Health Service and State and local agencies concerned with the supervision of vessel-watering points.

The standards set forth in this handbook are concerned with the protection of water during the course of delivery from an approved source to the filling connections of the vessel's potable-water storage tank. They cover the water-distribution system, protection against backflow from vessel to shore, protection on board ship and at the pier, hydrants, watering hoses, appurtenances, and water boats. Photographs and line drawings illustrate satisfactory installation of watering facilities.

The handbook also includes pertinent sections of the Interstate Quarantine Regulations, a brief description of the interrelationships of vessel companies, State health departments, and the Public Health Service, relative to methods of approving water supplies and watering points. It contains a copy of the PHS form, Report on Vessel Watering Point Sanitation.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Gamma Globulin in a Poliomyelitis Outbreak In Montgomery, Alabama, 1953

By D. G. GILL, M.D., Dr.P.H.

MONTGOMERY, the capital of the State of Alabama, is located in the County of Montgomery. Together they have a population of approximately 140,000, with the city accounting for 110,000 and the rural areas accounting for the balance. A well-organized county health department serves the health needs of the combined area.

This was the setting for the first mass use of gamma globulin under the 1953 national allocation plan in an attempt to stop a threatened epidemic of poliomyelitis. Early in 1953, cases of poliomyelitis were recognized in Montgomery, but there was no indication of serious trouble until the month of June brought reports

of 55 cases to add to the 30 cases already recorded. Earlier experience in Alabama revealed that 15 percent of the cases normally occurred prior to July 1, so that the area readily met the criterion of a projected rate of 300 cases per 100,000 population by the end of the year.

Request that Montgomery and Montgomery County be permitted to use gamma globulin came from Dr. A. H. Graham, the county health officer, and his board of health, consisting of five of the leading physicians in the city. With the assurance that 250,000 cc. of gamma globulin could be made available, it was decided on Friday, June 26, 1953, to attempt the task of mass injections. Past experience in conducting mass surveys for tuberculosis and mass blood tests for syphilis led to the belief that a mass gamma globulin inoculation program could be undertaken.

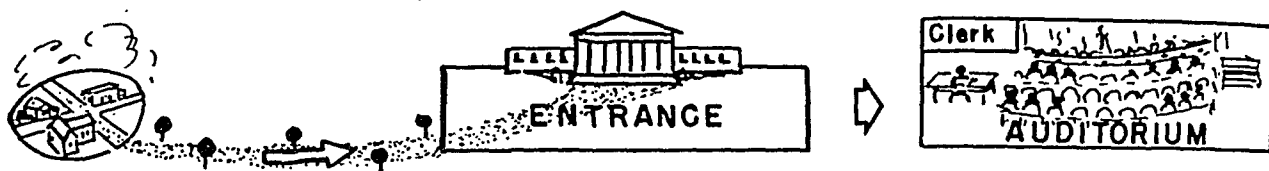
It was felt that not only did the situation demand immediate action but that the program should be finished by July 4. Accordingly, the period June 30–July 3 was selected for actual injections. The combined resources of the Montgomery County Health Department and the Alabama State Health Department were merged into one unit, which functioned as such, and assignments were given to key personnel.

Calling the Alert

Some of the steps taken and the reasoning behind them are summarized as follows:

Dr. Gill, the State health officer of Alabama, took his doctorates in medicine and in public health at the University of Toronto. He joined the Alabama Department of Public Health as epidemiologist in 1925 and became director of the bureau of preventable diseases in 1928. During the war, he served as medical director of the Alabama Selective Service. In addition to holding an associate professorship in public health at the University of Alabama, Dr. Gill is chairman of the Committee of Epidemiologists, Association of State and Territorial Health Officers, and associate editor of the Journal of the Medical Association of the State of Alabama.

On p. 1025, another facet of administering gamma globulin on a mass basis is described in detail.



Flow chart of typical gamma globulin administration procedures used in Montgomery, Ala., mass inoculation program. Clinics were held in the public schools; 800 volunteer workers were recruited. **AT ENTRANCE.** 1 clerk assigns clinic numbers to families, who are asked to be seated in the school auditorium and to leave 1 seat between each family to prevent contagion. **AUDITORIUM.** 1 clerk calls families by number, in turn.

A mass meeting of physicians was called for the night of June 26. It was attended by almost every physician in the area. The response was unanimous, and the physicians agreed to work on any schedule assigned to them. It was agreed that inoculations should be performed only by physicians since the possibility of accidents and reactions could not be overlooked. Not once did the pressure of private practice prevent the complete staffing of all clinics. The furnishing of lollipops at each clinic was suggested by one physician and was carried out by the physicians themselves.

Nurses were needed in numbers at least equal to physicians. Since it was early apparent that sufficient local nurses were not available, the director of nursing for the Alabama State Department of Health was made responsible for procuring additional nurses to assist in the clinics. Fifty county health nurses from all over the State were ready for duty in Montgomery by Monday morning, June 29. Many brought their own scales since weighing was on the list of musts.

Volunteer Groups

An unknown number of volunteers were needed, and the responsibility of obtaining and assigning them to duty was a formidable task. The parent-teachers' association was requested to take on this responsibility because their organization cut across all social and economic lines and because schoolhouses were to be used as clinic points. Between Saturday morning,

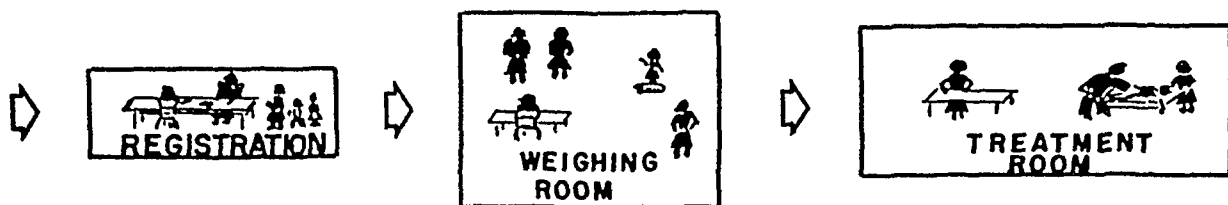
June 27, and Monday morning, June 29, 600 of the eventual 800 volunteers were recruited and brought to a mass meeting at the city hall where already-appointed team captains enlisted the numbers each needed and began the assignment of work hours and particular tasks.

Throughout the mass program, all matters pertaining to volunteers were referred to the PTA organization, which saw to it that enough people were on duty at each clinic. Their members obtained lunches for the workers who were unable to leave at mealtime. They made arrangements with the police and fire departments, the sheriff's office, the transportation companies—anything that could be handled by a nonprofessional staff was done and done expeditiously.

Technical details of syringe and needle sterilization—as needed originally and as needed for re-use—were handled by the laboratory staff of the State health department. Cleaning syringes and autoclaving ran far into the nights.

Medical Corpsmen

Montgomery has two Air Force posts, at Maxwell and Gunter Air Force Bases. Because neither field could obtain globulin supplies through Service channels promptly, both were included in the overall planning. Not only did the posts do their own inoculating, but they also furnished physicians and nurses for the city clinics. Another and extremely valuable contribution was made by a large number of



REGISTRATION. 2 clerks handle details of registering children. **WEIGHING ROOM.** 4 clerks are busy: 1 weighs the child; 1 records the weight and the amount of gamma globulin dosage; 1 escorts the family to the treatment room; and 1 maintains an even flow of patients. **TREATMENT ROOM.** Of the 10-15 aides, 4-6 remove pants, 4-6 stain buttocks, and 2-3 wash syringes.

medical corpsmen who proved adept at handling the unruly few and who gave assurance to many of the timid.

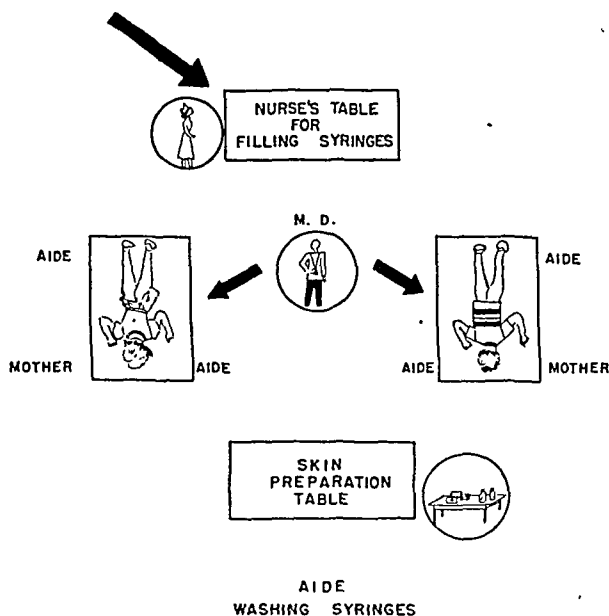
Public relations was an important consideration. Montgomery has 2 daily papers, a weekly paper, 6 radio stations, and 1 television station. In addition, the national news agencies, the newspapers from surrounding cities, national magazines and national radio, newsreel, and television companies were all intensely interested in the progress of the program. The offer of the Governor to utilize the facilities of the State's public relations bureau was gratefully accepted, and, insofar as possible, all releases were made through that agency. Montgomery citizens had been reaching a stage of severe apprehension, but the full coverage given by all agencies and the knowledge that something was being attempted served to allay hysteria and led to an intelligent support of plans.

The thousand and one details of planning clinics, procuring equipment and supplies, training personnel, and seeing that everything functioned smoothly was the task of Dr. W. H. Y. Smith, director of the bureau of preventable diseases in the State health department, and his staff of trained workers. The staff members who had been conducting X-ray surveys or blood tests applied the same techniques to handling the organization and the unification of diverse groups into a functioning whole. After the first hour, clinics operated smoothly, efficiently, and with a minimum of trouble. A

central headquarters with a battery of telephones was the nerve center of the mass inoculation program.

Almost 33,000 Inoculations

The details of actual administration were not too difficult. Twelve schools in the city and six in the county were chosen. All were open from



TREATMENT ROOM DIAGRAM. Chart shows arrangement of tables for inoculation teams, Montgomery, Ala. Usually, several physicians were on duty, each working with a separate table arrangement.

8 a. m. to 4 p. m., and a number were held open from 6 to 8 p. m. to accommodate working parents.

To avoid overcrowding it was necessary to allocate family groups to separate days. The Montgomery telephone directory, when divided into quarters, indicated that families might be similarly divided according to their surnames. Thus, all whose family names began with the letters A-F were asked to come on Tuesday, June 30, G-L the next day, M-R the third day, and the balance on the last day, Friday, July 3. Actually, of course, the first day was the heaviest, partly because some families were leaving town over the Fourth of July.

The general flow of clinic procedures and the arrangements for a treatment room are shown in the charts. In actual practice, sev-

eral physicians were frequently on duty, each with the setup shown. The arrangements for registration, weighing, and figuring the dosage of gamma globulin were sufficient, however, to prevent any delays in this part of the program.

During the 4-day period, June 30-July 3, 32,948 children, 9 years or under, received a gamma globulin dosage of 0.14 cc. per pound of body weight. Because the 1950 census had reported about 30,000 children at that time in this age group, we believe that the coverage approached 100 percent. The average dosage was about 6 cc. so that the supply of gamma globulin available was ample for this group.

The successful completion of a major undertaking on short notice is a tribute to the citizens of the community and to the staffs of the combined health departments.

Excerpta Medica Adds New Cancer Section

A new section on cancer, containing abstracts from medical journals of the world covering cancer and related fields, has been added to *Excerpta Medica*. Forming section XVI of the internationally known abstracting service, volume 1, No. 1 of the new periodical is dated July 1953.

Publication of a section devoted entirely to cancer has been under consideration for some time by editors of *Excerpta Medica*. Abstracts of all articles appearing in the international medical press concerning cancer previously were divided in the 15 sections of *Excerpta Medica*. Now this medical literature will be available to physicians in a single volume. The project was made possible through the aid of grants from the National Cancer Institute of the Public Health Service and the American Cancer Society.

The section on cancer carries 25 classifications. Abstracts of 424 articles falling into 14 of these classifications appear in the first issue. It will be published monthly and will contain 700 to 800 pages of abstracts a year. An index of authors will appear each month, and a classified subject and authors' index will appear annually.

The new publication is published in Amsterdam, as are other sections of *Excerpta Medica*, and has an editorial board composed of 32 members in addition to the two chief editors, Dr. R. van Dam and Dr. W. van Westering of the Netherlands. Twenty-two members of the editorial board are in America. Nine of the other members are divided evenly among nine western European countries, and one member is in India. National Cancer Institute members of the board include Dr. John R. Heller, director, Drs. Raymond F. Kaiser, Ross C. MacCardle, and R. R. Spencer, the last a former director of the National Cancer Institute, now retired.

Organizing Mass Gamma Globulin Clinics In Three North Carolina Counties

CHARLES M. CAMERON, Jr., M.D.

SOME 30,000 children were inoculated with gamma globulin on a mass basis in three western North Carolina counties during the period from July 6 to August 7, 1953. Inoculations were given in Caldwell County on July 6, 7, and 8, and 12,800 children were processed in the 3 days. Catawba County was the site of a 3-day inoculation program on July 15, 16, and

17, at which time 14,761 children were given gamma globulin. In Avery County, during a 2-day program on August 6-7, 3,092 children were inoculated. The pattern developed for operating the mass gamma globulin clinics in North Carolina has proved to be highly effective.

This discussion outlines the purely administrative aspects of formulating and operating a globulin mass inoculation clinic. The criteria which must be fulfilled by a county prior to receiving globulin from the Office of Defense Mobilization varied according to the amount of globulin available, and these, accordingly, are not included.

Dr. Cameron, as chief of the communicable disease control section, division of epidemiology, in the North Carolina State Board of Health, was in immediate charge of organizing the mass globulin clinics in the three North Carolina counties where poliomyelitis in epidemic form was prevalent during July and August 1953. For a report of how Montgomery, Ala., handled a threatened epidemic, see p. 1021.

After receiving his medical degree at Vanderbilt University Medical School in 1948, Dr. Cameron served as district health officer with the Tennessee State Health Department, from 1949 to 1951. During the next 2 years, he was assigned as a Public Health Service commissioned officer to the Branch of Health, Bureau of Indian Affairs. Dr. Cameron has been attending the School of Public Health, University of North Carolina, where he has completed work on his master's degree in public health.

A manual based on the operations described in this report has been distributed to all local health departments in the State.

Sequence of Events

The timetable of events in each of the three North Carolina programs broadly assumed the following sequence:

The county medical society unanimously asked the local health department to forward to the State health officer a request that the county be considered for the mass use of gamma globulin. On the basis of the age distribution of the poliomyelitis cases reported up to then, the society also set the age limits of children who would receive globulin—usually all children between birth and 10 years.

The local health officer forwarded the request and an estimate of the number of children in the selected age group. The estimate was ob-

tained from census reports, birth rates, and death rates. To determine a county's eligibility, it was necessary for the health officer to supply the following additional data to the State health officer: total number of cases with age distribution; onset of cases by day; number of deaths from poliomyelitis; ratio of paralytic cases to nonparalytic cases; and number of respirator cases.

The request was reviewed by the State health officer. Upon approval, it was telephoned to the Public Health Service in Washington, D. C., acting as the allocation agent for the Office of Defense Mobilization, which advised that globulin would be granted, how much would be available, and when it would reach the county. This information was immediately transmitted to the county health officer.

The North Carolina State Board of Health, either from the central office or directly from the field, contacted the New York office of the National Foundation for Infantile Paralysis and informed it of the gamma globulin grant to the county and the estimated number of children to be inoculated so that a sufficient supply of needles and syringes could be sent. The Foundation shipped by air express directly to the county these and the other supplies it provided.

The globulin was shipped directly by air from the manufacturer to the county health officer.

The local health officer then had the responsibility for determining the number and schedule of clinics necessary to cover his county. To do so, he considered the availability of physical facilities such as schools for suitable clinic sites; the population distribution within the county; routes of transportation and communication, and the general availability of transportation; and the number of local physicians, nurses, and nurses' aides available to staff the clinics.

At this point, the following necessary efforts were carried out simultaneously. The State board of health was requested to recruit any additional physicians and nurses who might be needed to staff the clinics. The organization for local lay workers was set up, and the recruiting of the volunteers was started. The supply and equipment items to be obtained locally were

listed (see minimum list), and procurement was begun. Public relations outlets such as press and radio were alerted, and arrangements were made for the regular release of pertinent information, particularly within the county.

Once clinic sites were agreed upon, it was necessary to see that tables and other fixtures were available and that water, lights, refrigeration, and telephones were in operating condition.

Two nights before the opening of the clinics, a mass meeting of all volunteer workers was held at the clinic at which they would serve. At that time, job assignments were made, and the techniques of clinic operation were outlined. The National Foundation for Infantile Paralysis assisted in the orientation of lay volunteers by showing the movie "Marbles and Lollipops."

On the day before the beginning of the clinic operation, supplies were moved to the clinics from the central supply depot. The gamma globulin, however, was kept under refrigeration until the day the clinic opened. Globulin must be stored and maintained at 40°-50° F., and appropriate storage facilities in the county had to be obtained.

As they were recruited, local professional personnel were assigned to the respective clinics. As the outside professional personnel arrived, they were assigned living quarters by the health department staff member in charge of housing professional workers. They also were assigned to work in the respective clinics as they arrived. Arrangements for transportation to the clinic sites were completed with the motor pool.

Administration and Operations

The county health department was the official agency in charge of all operations within the county. The local health officer of the respective counties was in charge of the entire mass inoculation operation within the county. He worked directly under the supervision of the local board of health and was assisted by a poliomyelitis committee of the local medical society and by the chief of the communicable disease control section of the North Carolina State Board of Health's division of epidemiology. With the aid of his staff and consult-

ants, he made the decisions as to the sites, scheduling, and operation of the clinics.

The recruitment and scheduling of local professional personnel in two counties was handled directly by the health officer or by a health department staff member; in another, they were the responsibility of a member of the poliomyelitis committee of the local medical society. Both systems worked equally well. The recruitment of additional professional workers from outside the county was handled in every instance by the State board of health; and the housing and scheduling of these workers was handled by the local health department staff. The sched-

uling and handling of lay workers was delegated to a lay chairman and his associates.

Because of the complexity of the organizational and operational setup of the mass inoculation program, the entire time of the local health officer and of the State consultant was required to keep the clinic program operating smoothly. When actual operations began, 1 of these 2 individuals remained on duty at the command post at all times. The other circulated from clinic to clinic, generally supervising field operations.

Keeping the distribution and flow of supplies continuous was a difficulty. Because the ratio

Minimum equipment and supplies for each gamma globulin clinic, North Carolina, 1953

Equipment	Supplies	Supplies—Continued
14 30" x 5' x 6' cafeteria-size tables.	Syringes $\frac{3}{4}$ 10 cc.; $\frac{1}{4}$ 5 cc. (at least 500 total). ¹	12 lead pencils.
4 3' x 4' tables (cafeteria tables may be used).	1 No. 20 or No. 22 needle per child (disposable). ¹	100 yds. masking tape ($\frac{3}{4}$ ").
12 adult-size chairs for use at registration, and by recorders, nurses, and syringe-process workers.	12 pts. alcohol per 1,000 children.	2 boxes syringe cleaner per day. ¹
6 large waste cans.	4,000 cotton balls per 1,000 children.	4 globulin dose charts.
8 4' x 4' x 5' screens for use in screening registration and weighing desks from injection area (sheets suspended on wires may be used).	1 string tag per child.	2 pairs forceps.
10 blankets (8 for injection tables; 2 on first aid cot or table).	1 safety pin per child.	2 pairs pliers.
12 basins, pots, pans, etc., for syringe wash workers.	1 3" x 5" plain index card for registering each child.	
2 spring-type scales.	6 packages paper towels.	Emergency Tray
6 electric fans (4 for general use in clinics; 2 for drying syringes).	12 sheets for gamma globulin tables.	{ 3 2 cc. syringes.
6 18" x 24" x 12" wire baskets (grocery store wire basket) for packing syringes before autoclaving.	100 paper cups.	{ 3 No. 26 needles ($\frac{3}{4}$ ").
6 soup bowls for alcohol sponges.	2 pairs scissors.	{ 1 5 cc. syringe.
1 public address system.	1 6' x 30" width roll paper per child. ¹	{ 3 No. 20 needles (1 $\frac{1}{2}$ ").
1 stethoscope.	18 yds. elastic tape per 8 injection tables.	{ 1 10 cc. syringe.
1 blood pressure apparatus.	100 adhesive bandage strips.	{ 1 No. 22 needle (3").
	1,000 rubber bands. ¹	6 ampules adrenalin.
	1,000 gauze squares.	6 ampules phenobarbital sodium.
	6 bars soap.	1 bottle Benadryl.
	1 gal. liquid detergent.	1 4-oz. bottle aromatic spirits of ammonia.
	500 envelopes or syringe wraps. ¹	1 doz. adhesive bandage strips.
	2 staplers (if envelopes used).	Alcohol sponges.
	Extra staples.	Tourniquet.
	1 syringe opener. ¹	
	12 red pencils for marking tags and gamma globulin dose.	Other

¹ Shipped air express by the National Foundation for Infantile Paralysis. Needles and syringes were packaged and autoclaved prior to use in clinics. The syringes, which were supplied on loan, were returned to the Foundation at the close of the program.

of children to the supply of syringes was high, it was necessary to clean, pack, and re-autoclave syringes while the operation was in progress. Local hospitals did all the autoclaving without charge. A supply depot was created at the local health department in each county. Supply transport corps were set up in two counties by the National Guard and in the third by volunteer workers.

In every county, communications between the clinic and the health center were maintained by telephone and by short-wave radio. The radio eliminated the overtaxing of telephone facilities at the health center. Radio sets and operators were volunteered by National Guard units and by other groups, and their location in the clinics and health centers greatly facilitated communications. This procedure is recommended for any operation of this type.

School lunchrooms were selected as the most suitable clinic sites. School authorities were most cooperative in making all facilities available. Usually, schools are located in centers of population, are easily reached by road, and parents were therefore asked to go to the clinic in the school nearest their home.

It was not considered feasible to attempt to assign the residents within certain geographic areas to any particular clinic, nor did it appear necessary to attempt to take various segments of the population on an alphabetical basis, chiefly because the amounts of globulin available were limited, and the supply was usually exhausted before the end of the scheduled operations.

Role of the State Board

In every county the program was recognized as one of local origin and as a local responsibility. The role of the State board of health in the clinics varied slightly from county to county. Briefly, the board:

Assisted the local health officer in the administration of the program.

Through the communicable disease control section of the division of epidemiology, supplied consultation to the local health officer in the organization, planning, and staging of the clinic.

Detailed a field epidemiologist to assist the

health officer in the investigation, collection, and tabulation of epidemiological data relative to the poliomyelitis outbreak.

Recruited professional personnel, both physicians and nurses, from other local health departments and medical centers in the State.

Served as the official channel of communication with the Office of Defense Mobilization, the Public Health Service, and the National Foundation for Infantile Paralysis.

Through the public relations officer in the Raleigh office, assisted in the release of public information about the incidence of poliomyelitis and the gamma globulin program.

Provided plans, program, and personnel for the evaluation of the possible effect of gamma globulin on the incidence of poliomyelitis; on the administrative aspects of staging a mass inoculation clinic; and on the allocation and distribution of gamma globulin.

Clinic Organization

A basic clinic unit was set up for all North Carolina clinics. Each unit consisted of a professional group and a lay group. The organization of each lay group was planned so that it was possible to process patients for one or more groups of professional workers. In smaller operations, the clinic staff was composed of 1 professional group and 1 lay group. In the larger operations, as in Catawba County, each lay group served 2 or 3 professional groups with ease.

Professional Personnel

All inoculations were given by physicians to avoid any criticism which might have resulted from any immediate or delayed untoward reaction to the injections. The basic professional operational unit was composed of 2 physicians, 1 public health nurse in charge, 5 registered nurses, and 4 nurses' aides.

At times, the nurses performed the aides' duties and also rotated jobs with the other nurses in the clinic. Four of the registered nurses checked the dose of globulin, which had been calculated at the weighing table, and filled the syringe with the correct amount. One registered nurse was assigned as a relief nurse to

circulate in each clinic and to supervise the cleaning and packing of syringes and the distribution of other supplies.

The aides' duties consisted of carrying the filled syringe to the injection table without contamination and assisting the physician by cleansing the skin.

A local public health nurse was assigned to each clinic and designated as the professional worker in charge of the entire operation. It was her responsibility to see that each worker performed his prescribed tasks, that supplies were sufficient, and that the clinic operated at maximum efficiency at all times.

Local physicians worked only 4-hour shifts because of their immediate responsibilities in the community. Physicians recruited from outside sources worked 8-hour shifts. The majority of nurses and nurses' aides in the local community were also used on 4-hour shifts, but nurses recruited from other county health departments or elsewhere usually worked at least 8 hours a day. The public health nurse in charge was on duty throughout the hours of clinic operation, either 10 or 12 hours, with only short periods of relief.

The assistance of all professional workers—physicians, nurses, nurses' aides—who were county residents was enlisted. At no time was there a sufficient number of professional workers present in the county to meet the staffing requirements of the program.

In the recruiting of additional personnel, the North Carolina State Board of Health played a key role in the staging of the globulin clinics. Working through its division of epidemiology, the State board of health contacted numerous county health departments throughout the State in the search for volunteer public health nurses who could be spared to participate in the mass inoculation programs. The response from the local health officers in making personnel available was excellent and indicative of the good neighbor policy which exists among health departments in the State.

The division of epidemiology also took the lead in contacting the three medical schools in the State in requesting that resident physicians assist in the administration of gamma globulin.

Duke University School of Medicine, the University of North Carolina School of Medi-

cine and Memorial Hospital at Chapel Hill, and the Bowman Gray Medical College and Baptist Hospital in Winston-Salem made physicians available to serve in the clinics. The globulin program would not have been possible without their assistance. In all North Carolina operations, professional workers volunteered their time.

Volunteer Workers

All volunteers needed to operate globulin clinics were recruited from the community in which the operation was staged. Persons under 16, pregnant women, and anyone suffering from acute or chronic communicable diseases were excluded from the volunteer ranks. All the workers served without reimbursement directly under the supervision of the chairman for each clinic.

The health officer named an overall chairman in each county to head the volunteer lay workers. He, in turn, named a chairman for each of the proposed clinics. The latter was responsible for recruiting and assigning volunteer workers to the various clinic shifts.

Often, these chairmen recruited the entire membership of various community clubs and organizations to serve on a given shift in the clinics. In the instance of a clinic scheduled to operate in the same site for more than 1 day, the same group was asked to work the same shift each day in order to reduce the confusion and time lost in reorienting lay workers.

The usual shift of duty for the lay volunteers was from 5 to 6 hours a day, since this group assisted prior to the daily opening of the clinic in distributing supplies and materials and remained for clearing up after the clinic closed.

A minimum of 40 volunteers was needed for each shift in each basic clinic unit. However, the single basic lay unit was able to handle the patient load for as many as 6 or 8 physicians and the corresponding number of nurses and aides. This was accomplished by adding one guide for each injection table added to the clinic.

In addition to the chairman of each volunteer unit, the basic minimum of 40 to a shift consisted of 2 hostesses, 10 guides, 2 clerks at the registration table, 2 weighers at the weighing



Left: Local nurses prepare gamma globulin ampules before the opening of the Lenoir (Caldwell County, N. C.) clinic. Above: Volunteer workers from the Caldwell County area receive instructions from their chairman before the program starts.

table, 2 clerks at the weighing table, 2 lifters (male) to pick the children up from the injection tables, 2 workers at the first syringe wash table, 4 workers at the second syringe wash table, 4 workers for the syringe drying, wrapping, and packing detail, 2 janitors, 2 policemen or others for directing traffic, 2 workers for distributing candy and other treats to the children, 1 worker to distribute poliomyelitis leaflets, 1 telephone operator, 1 telephone messenger, and 1 radio messenger.

Transportation Corps

The transportation corps was an integral part of the lay organization. It was responsible for transporting to and from the clinics any parents and children when they did not have the means of reaching the clinic; professional personnel, particularly those recruited from outside the county who lacked transportation or who were unfamiliar with the county; and lay volunteers when they had no means of reaching the clinic.

Organization and operation of the transportation corps was successfully delegated to a local club or organization, which called on automobile dealers, taxi companies, and other groups to supply automobiles and drivers.

Motor pool headquarters were set up away from the health center to reduce traffic and tele-

phone calls into the center, which usually served as a nerve center for the entire operation. The telephone number of the motor pool was widely circulated in the county.

The trucks, jeeps, and other vehicles needed to transport supplies and other materials to and from the clinic sites made up a separate unit of the motor pool. This supply transport unit usually functioned directly under the health department staff.

Public Information

Informing residents of the county about the details of the inoculative program schedule was not a problem in those counties with local radio stations and local daily newspapers. Avery County, however, does not have these outlets, and there the problem of informing the people was more difficult. For Avery County, then, these procedures were followed:

All telephone subscribers were called and advised of the clinic sites and schedules.

All persons on the tax rolls received a postcard giving the necessary information.

Posters and leaflets were prepared and distributed over the county.

All rural mail carriers were given the facts and were asked to spread the word along their routes.



Above: A busy registration area in a typical clinic setup. Right: A boy at the Lenoir clinic gets his shot of gamma globulin. The physician inoculates; the aide holds the child; and the male volunteer, a local fireman, stands by to lift the child from the table.



All ministers were asked to tell their congregations about the clinics.

The cooperation of two local political organizations representing the Democratic and Republican national parties was enlisted. They agreed to spread the word from house to house in the more isolated areas.

All volunteer clinic workers who attended the mass meeting 2 nights before the start of the program were asked to carry the word to their respective communities.

Newspapers from outside areas which circulate in the county and radio stations were asked to feature the news for Avery County residents.

Relations with the press proved to be an important phase of the operation. In two counties, all press contacts were made by the local health officer. In a third county, a lay worker with a newspaper background was placed in charge of the press releases. The former method was more effective inasmuch as it is sometimes difficult for a layman to interpret and translate medical concepts and ideas as effectively as a physician. In addition, it permitted the health officer to maintain the close supervision over the content of the press releases which is not possible with the latter method.

News Releases

Press and radio releases featured these ideas:

Clinics would remain in operation at all times during the scheduled hours and would continue operating until the inoculation of all specified children had been completed or until the supply of globulin had been exhausted.

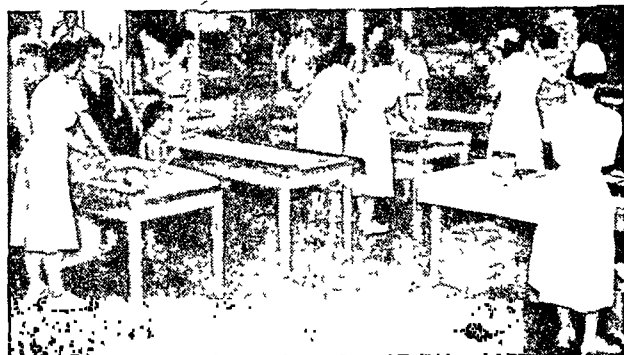
Only children who were regular residents of the county or children of transients who would remain in the county for at least 21 days would be eligible to receive the inoculations. Injections would be limited to the stipulated age groups.

Globulin would be given to noncontacts of cases only at the mass inoculation clinics. None would be available for administering in the private physician's office.

Inoculations would be given on a first-come, first-served basis. Wherever possible, parents should take children to the clinic nearest their homes.

Contacts of poliomyelitis cases should go to the family physician to receive globulin from the local health department's supply which was earmarked for administration to contacts.

Every effort would be made to avoid crowding at the clinics. Children with communicable diseases should not be brought to the clinics.



Left: A lull during the clinic procedure at the East Harper School, Caldwell County. Only 2 of the 4 injection tables are in use. **Right:** Peak of the rush period at the Harper School clinic. On the facing page at the left: Workers in the back of this cafeteria—school lunchrooms were used for gamma globulin administration in North Carolina—are wrapping syringes before autoclaving. The nurses in the foreground are filling syringes with immune serum globulin on the basis of weight-

One parent could accompany each child through the clinic.

Children should be dressed as simply as possible to facilitate undressing on the injection tables.

All inoculations would be given in the right hip.

As to the question of exceptional children or those with chronic illness, crippling, or other conditions, the parent should consult the family physician if there were any doubt as to the desirability of having the child inoculated.

Gamma globulin is harmless in most cases. However, some few children might experience headache, fever, chills, pain, or swelling about the inoculation site. If these reactions occurred, the parent should consult the family physician.

Clinic Procedures

The North Carolina clinics were scheduled to operate for either 10 or 12 hours a day. Caldwell and Catawba County clinics inoculated from 9 a. m. to 9 p. m., requiring 3 shifts of workers each day. Avery County clinics were open from 10 a. m. to 8 p. m., and 2 shifts a day were used.

A hostess met the parent and child at the entrance of the building. She assigned each child a number in the order of arrival at the clinic. The number was written on a small tag, which was pinned to the child's back so that it would be seen when the child lay on the injection table. If the group waiting was a large one, the parent was asked to wait either outside the building or in the auditorium.

When this procedure was necessary, the children were called back to the clinic, over a public address system, in groups of 20. When the waiting line was small, the parent and child were sent immediately in to the clinic. There each child was met by a guide who escorted both child and parent through the complete clinic procedure.

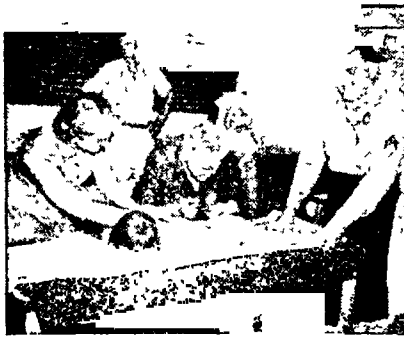
The first stop for parent, child, and guide in going through the clinic was at the registration desk where a 3- x 5-inch index registration card was filled in with the child's name, age, sex, and race and with the parent's name and address. (Documentary evidence of age or place of residence was not required.) The number on the child's tag was recorded on the card.

The second stop was at the weighing table where the child was weighed, and the globulin dose was calculated from a weight-dose chart. The amount was entered on the registration card.

The card was then left at the nurses' table. Next, the child was taken to the injection table, placed on it, and undressed as much as necessary.

The nurse checked the calculated dose using a weight-dose chart, filled a syringe with the correct amount, and handed both the syringe and registration card to an aide who took them to the injection table where the child had been placed. By assigning each physician four injection tables, almost no physician-time was lost in getting children on and off the tables.

The syringe was handed to the physician by the aide who then returned to the nurses' table. After the physician had inoculated the child,



dosage data. Center: Another view of a boy receiving a shot of gamma globulin. The police sergeant standing at the foot of the injection table was one of the volunteer male lifters at the Lenoir clinic. Right: Volunteer aides in the Lenoir clinic wash syringes before they are repacked and autoclaved for the next day's operation.

he handed the syringe to the guide who gave it to the worker at the first syringe wash table. The guide then helped the mother dress the child and escorted them to the exit where the child was given candy and ice cream and the mother received a leaflet, supplied by the National Foundation for Infantile Paralysis, which explained gamma globulin.

The guide then returned to the entrance to meet another parent and child.

At the first syringe wash table, the syringe and needle were flushed with washing solution, the needle was removed, and the two parts of the syringe were dismantled and fastened together with rubber bands. After the syringes were soaked for 20 minutes in a cleaning solu-

tion, they were taken to the second wash table, where they were cleaned with a bottle brush, rinsed, and placed on a clean sheet to dry. Drying was hastened by having electric fans blow over the area. When dry, syringes were not reassembled but were either wrapped in a special wrapper or in a paper towel, or they were dropped into a small envelope. They were then packed in wire baskets and returned to the hospital for autoclaving.

The programs in each of the three counties worked smoothly and efficiently, without congestion at the clinic sites, and with highest praise from parents whose children were brought to the clinics for gamma globulin administration.

Poliomyelitis Distribution In the United States, 1952

A record number of poliomyelitis cases were reported in the United States in 1952. The final figures show a total of 57,879 cases. This

Dr. C. C. Dauer, medical adviser of the National Office of Vital Statistics, Public Health Service, continues here the annual report series on poliomyelitis in the United States.

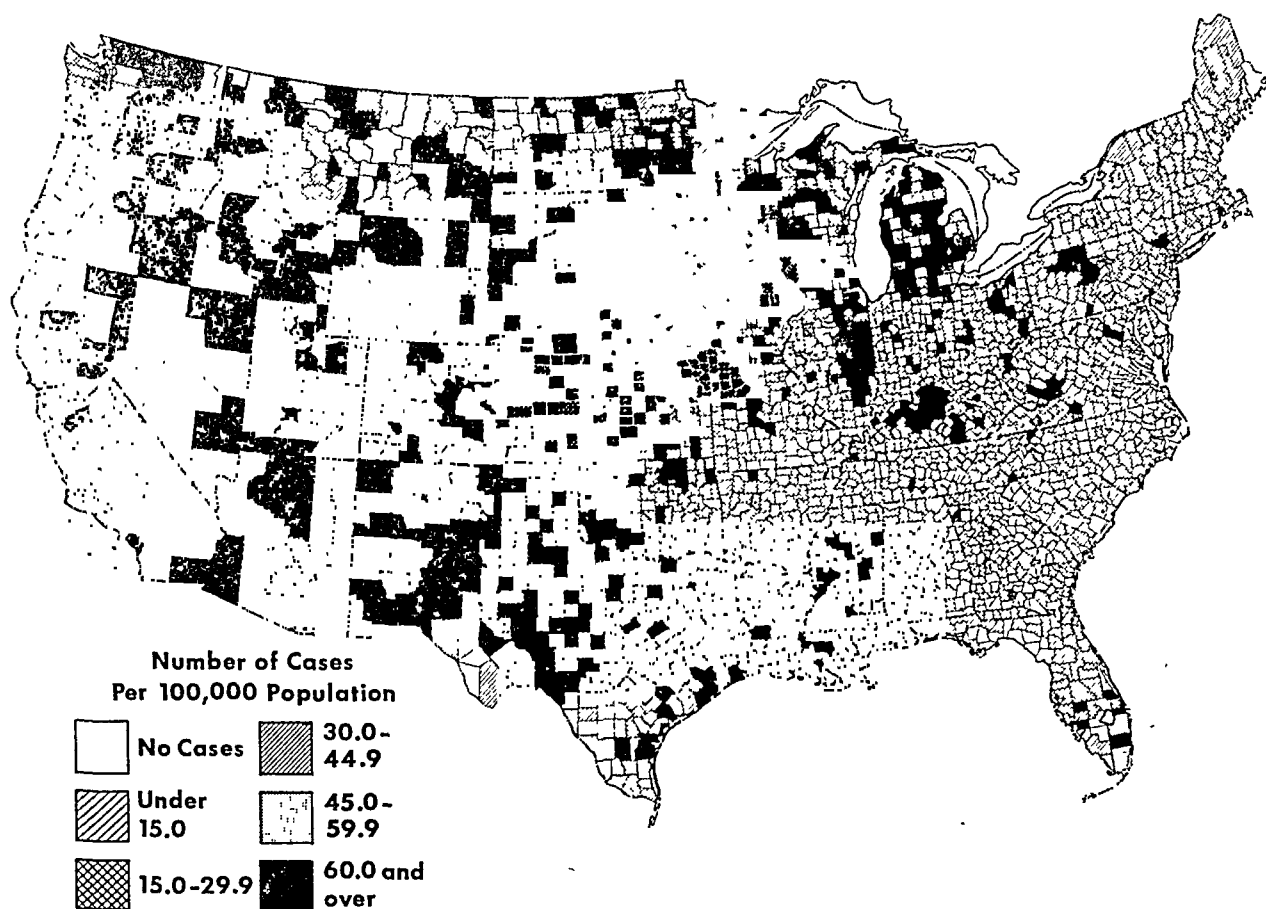
total is almost 38 percent higher than the previous high year of 1949, when a total of 42,033 cases was reported. The incidence rate in 1952 was 37.2 cases per 100,000 population, and the estimated death rate, based on a 10-percent sample of deaths registered, was 2.1. The estimated case fatality rate for the country as a whole was approximately 5 percent. Since 1916, when the rate was about 25 percent, the case fatality of the disease has declined grad-

ually. In the decade of 1930 to 1939 it was about 13 and in the following decade it was 7.5 percent.

Although Minnesota, California, Illinois, Texas, and Michigan reported the largest number of cases in 1952, the States which had the highest incidence rates were Nebraska with a rate of 163.9 cases per 100,000 population, South Dakota with 153.2, Minnesota with 136.7, Iowa with 134.7, and Kansas with 85.8. Nine other States in various sections of the country had morbidity rates in excess of 50 per 100,000.

As shown in the accompanying map the most extensive epidemic area extended diagonally across the United States from Minnesota and Wisconsin in the north to Texas and New Mexico in the southwest. Other smaller areas of high incidence are also shown.

About 37 percent of the total number of cases reported were classified as paralytic and 22 percent as nonparalytic. The status of the remaining 41 percent is unknown and is designated as unspecified.



Distribution of poliomyelitis in the United States, by county, 1952. This map is the 20th of the series showing distribution by counties in the continental United States. The first report appeared in Public Health Reports in 1938, and covered the years 1933 to 1937, inclusive, but subsequent reports have shown the distribution for single years. The series was begun at the suggestion of the late L. L. Lumsden, who was keenly interested in the geographic distribution of diseases, particularly tuberculosis.

Case Finding Through Multiple Screening

By ARNOLD B. KURLANDER, M.D., M.P.H., and BENJAMIN E. CARROLL, M.A.

DURING the past few years, there has been a widespread interest in multiple screening—an approach to case finding characterized by the application, to apparently well populations, of a combination of screening tests for various diseases or conditions. Within a period of 4 years, multiple screening has been given extensive trial, has demonstrated its ability to find cases of disease, and has been hailed by some as an important new tool in public health work.

It is the purpose of the present paper to discuss the methods and results of some of the more extensive multiple screening projects, to consider certain principles and problems of this approach, and to stress some of their implications for the planning of screening projects.

The brief but active history of multiple screening includes at least nine major projects, ranging from pilot studies that have tested a few thousand screenees to local or Statewide operations that have screened tens, or even hundreds, of thousands of persons. Screening has been incorporated in such research studies as those planned by the Chronic Disease Research Institute in Buffalo, N. Y., and by the Commission on Chronic Illness in Baltimore, Md., and in Hunterdon County, N. J. The procedure was established on a continuing basis in Alabama and Georgia, and has been operated as an annual project in Alexandria, Va., for the past 3 years. In addition, at least 30 other

projects throughout the country have come to the attention of the Public Health Service.

Screening, using a combination of tests—although not always called “multiple screening”—has for some time been conducted by industries and labor unions. Some of this work—for instance, that done by the International Ladies Garment Workers Union—antecedates the multiple screening projects operated by health departments.

To a limited extent, multiple screening has also been introduced into hospitals. At St. Michael's Hospital in Newark, N. J., several screening tests have been given to both inpatients and outpatients, with a significant return in newly discovered cases of previously unsuspected disease. Results of a cooperative project are now being analyzed, in which the District of Columbia's General Hospital and the Public Health Service screened outpatients to study case-finding possibilities. Some proponents of the multiple-screening approach recommend that all hospitals use screening as a general preventive medicine service, giving routinely such tests as height and weight, blood pressure, urinalysis, blood counts, hemoglobin, serologic test for syphilis, chest X-ray, and electrocardiogram.

Results to Date

In the trial projects discussed above, multiple screening has shown definite promise as a way of discovering previously unrecognized disease. Nine of the major projects together have screened more than a million persons and have identified approximately 50,000 cases of disease and/or abnormalities. In all proba-

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bility, this number represents a considerable understatement of the true case finding accomplished, since complete reporting of diagnostic followup is lacking. Furthermore, some of the projects mentioned have included only 2 or 3 tests, rather than the usual battery of 10 to 12.

The project carried out through the Permanente Foundation, which screened about 4,000 longshoremen in the San Francisco Bay area, and which secured rather complete followup reports on the persons screened, discovered new cases of disease in 19 percent of the men screened. The Indianapolis, Ind., pilot study discovered new cases of disease in 10 percent of persons screened. This project, which screened an almost entirely Negro population group, applied most of the same tests that were used in the Permanente project but obtained no followup reports on abnormal weight, vision, or hearing. In Richmond, Va., 9 tests were offered to the general population and followup reports were obtained on a large number of screenees. An analysis of the total persons screened showed that about 5 percent of this total were found to have previously unknown disease.

Thus, in screening projects testing various segments of the population, 5 percent or more of those screened have been found to have significant disease that was previously unknown.

The combinations of tests used by nine major multiple screening surveys and research projects are outlined in table 1. The most commonly used tests in these projects have been chest X-ray, serologic tests for syphilis, and blood sugar determinations.

Details of the major multiple screening projects are shown in table 2, which gives a brief statement of the methods used, standards applied and results obtained. It is evident, even on casual inspection of this table, that there has been great variety on each of these points. As pointed out earlier, there was also variation in the population groups screened. Such considerations make it clear that the figures shown here should not be compared without attention to all circumstances.

Many of the available reports lack complete followup information covering the verification of screening results and the number of new cases actually discovered. Those projects using a long array of tests include those with the most complete followup studies.

It seems appropriate to consider here certain of the fundamental concepts involved in screening. Misconceptions as to basic points may lead to misapplication of methods and standards, and ultimately to the impression that the technique is without merit.

Table 1. Summary of tests used by 9 major multiple screening projects

Type of test	Project									Total
	Ala-bama	Alex-andria	Atlan-ta	Boston	Georgia Coun-ties	Harnett Coun-ty, N. C.	Indi-anap-olis	Perma-nente	Rich-mond	
Cardiovascular history				(1)			X		X	1
Blood pressure		X		X			X	X	X	5
Electrocardiogram		X		X				X	X	4
Auscultation of heart							X			1
Chest X-ray	X	X	X	X	X	X	X	X	X	9
Serologic test for syphilis	X	X	X	X	X		X	X	X	8
Hemoglobin		X	X	X			X	X	X	6
Blood sugar	X	X	X	X	X	X	X	X		8
Urine sugar		X		X			X	X	X	5
Urine albumin		X		X			X	X		4
Height, weight, and build		X	X	X			X	X	X	6
Hearing		X		X			X	X		4
Vision		X		X			X	X	X	5
Intraocular tension									X	1
Self-screening history				X				X		2
Total	3	11	5	12	3	2	12	12	9	69

¹ Not included separately in screening line but covered by self-screening history.

Table 2. Summary of tests and standards used on various multiple screening projects, with available results of screening and of cases discovered on basis of diagnostic followup reports

Test, project, description, and standard for abnormality ¹	Number of persons screened	Percent abnormal on screening	Reports received		Estimated cases found ²	
			Total cases	New cases	Total	New
CARDIOVASCULAR HISTORY:						
Boston—See Self-screening history-----						
Indianapolis—Questions by physician on chest pain, dyspnea, orthopnea, rheumatic fever, and/or history of high blood pressure or heart disease-----	5,706	30.8	(⁵)	(⁵)	(⁵)	(⁵)
Permanente—See Self-screening history-----						
BLOOD PRESSURE (STANDARD METHOD):						
Alexandria, Va. (150/100)-----	6,151	11.0	{ 176 high 4 low (⁵)			
Boston (Master et al.) ³ -----	4,536	14.3				
Indianapolis (150/90)-----	5,711	25.7		(⁵)	(⁵)	(⁵)
Permanente (170/95)-----	3,989	21.0		369	207	369
Richmond (150/100)-----	37,442	14.6		1,306	162	2,584
ELECTROCARDIOGRAM:						
Alexandria, Va.—3 standard limb leads-----	6,027	7.0				
Boston—Lead I-----	5,057	(⁵)				
Permanente—3 standard limb leads and VI, V3, and V5-----	3,984	16.7	301	182	301	182
Richmond—12 standard leads-----	3,179	14.0	99	27	205	56
X-RAY, HEART—70 MM.:						
Alabama-----	168,290	.8	1,105			
Alexandria, Va-----	7,209	.4				
Atlanta-----	213,488	1.1				
Boston-----	4,536	(⁵)	(⁵)	(⁵)		
Georgia Counties-----	213,542		1,964			
Harnett County, N. C. (No data on method)-----	6,875					
Indianapolis-----	5,701	11.8	(⁵)	(⁵)		
Permanente-----	3,990	(⁵)	(⁵)	(⁵)	(⁵)	(⁵)
Richmond-----	37,548	5.7	433	55	1,010	129
COMBINED CARDIOVASCULAR TESTS:						
Boston—ECG and X-ray-----	4,536	4.4	41			
Indianapolis—History, blood pressure, auscultation, X-ray-----	5,711	31.6	336	93	646	177
Permanente—Blood pressure, ECG, and X-ray-----	3,990		571	339	571	339
X-RAY, TUBERCULOSIS—70 MM.:						
Alabama-----	109,967	.5	198			
Alexandria, Va-----	7,209	2.0				
Atlanta-----	213,488	1.9	287	234		
Boston-----	4,536	.07	1			
Georgia Counties-----	213,542	1.3	182			
Harnett County, N. C. (No data on method)-----	6,875	3.0				
Indianapolis-----	5,701	1.7	22	17	22	17
Permanente-----	3,990	4.2	⁶ 74	⁶ 33	⁶ 74	⁶ 33
Richmond-----	37,554	6.0	⁷ 289	⁷ 72	⁷ 770	⁷ 191
X-RAY, MISCELLANEOUS CHEST PATHOLOGY—70 MM.:						
Alexandria, Va-----	7,209	.1				
Atlanta-----	213,488	.3				
Boston-----	4,536		17			
Georgia Counties-----	213,542		1,626			
Indianapolis-----	5,701	2.7	⁸ 36	⁸ 8	⁸ 40	⁸ 10
SEROLOGIC TEST FOR SYPHILIS:						
Alabama—Kahn-----	221,312		4,747		4,747	
Alexandria, Va.—VDRL-----	2,504	1.5				
Atlanta—VDRL-----	228,024	9.8	11,671	2,245	11,671	2,245
Boston—Hinton-----	4,536	.2	5			
Georgia Counties—VDRL-----	244,493	9.9	12,520	6,965	12,520	6,965
Indianapolis—Mazzini-----	5,684	12.5	541	118	541	118
Permanente—VDRL or Mazzini-----	3,974	10.4	159	23	159	23
Richmond—Kahn-----	36,981	.6	168	50	169	51

See footnotes at end of table.

Table 2. Summary of tests and standards used on various multiple screening projects, with available results of screening and of cases discovered on basis of diagnostic followup reports—Continued

Test, project, description, and standard for abnormality ¹	Number of persons screened	Percent abnormal on screening	Reports received		Estimated cases found ²	
			Total cases	New cases	Total	New
HEMOGLOBIN:						
Alexandria, Va.—Cyanmethemoglobin (12 gm.)-----	2, 613	8. 7				
Atlanta—Copper sulfate (males 11 gm., females 10 gm.)-----	180, 128	5. 4				
Boston—Photoelectrometer (males 12.3 gm., females 10.3 gm.)-----	4, 536	4. 4	70			
Georgia Counties—Copper sulfate-----	225, 281	7. 0				
Indianapolis—Sheard & Sanford, with photoelectrometer (males 12.5 gm., females 11 gm.)-----	5, 694	16. 2	115	50	220	96
Permanente—Copper sulfate (males 12.3 gm.)-----	3, 986	. 1	1	1	1	1
Richmond—Dare hemoglobinometer (12 gm.)-----	37, 603	13. 2	1, 034	527	2, 111	1, 078
BLOOD SUGAR:						
Alabama—Modified picric acid (150 mg. % retest 180 mg. %, venous)-----	477, 846	6. 4	2, 032		4, 380	
Alexandria, Va., 1950—Modified picric acid (150 mg. %, venous)-----	2, 618	5. 7				
Alexandria, Va., 1951—Wilkerson-Heftmann (180 mg. %, venous)-----	3, 489	3. 2				
Atlanta—Anthrone (180 mg. %, later 170, venous)-----	211, 639	3. 3				
Boston—Wilkerson-Heftmann (180 mg. %, venous)-----	4, 532	3. 7	40			
Georgia Counties—Anthrone (170 mg. % under 2 hrs. postprandial, 180 mg. % over 2 hrs. venous)-----	266, 432	3. 2				
Harnett County, N. C.—Wilkerson-Heftmann (180 mg. % fasting, 180 postprandial, capillary)-----	6, 197	2. 1	74	48		
Indianapolis—Wilkerson-Heftmann (180 mg. %, venous)-----	5, 695	2. 2	48	22	48	22
Permanente—Wilkerson-Heftmann (180 mg. %, 1 hr. after 50 gm. sucrose, venous)-----	3, 966	3. 9	55	33	55	33
URINE SUGAR:						
Alexandria, Va.—Benedict (1+ or more)-----	7, 136	3. 3				
Boston—Clinitest (trace or more)-----	4, 536	3. 4	6			
Indianapolis—Clinitest (trace or more)-----	5, 704	2. 0	53	24	53	24
Permanente—Benedict (2+ or more)-----	3, 987	5. 0	53	28	53	28
Richmond—Clinitest (trace or more)-----	34, 124	1. 5	145	51	274	97
URINE ALBUMIN:						
Alexandria, Va.—Acetic acid (1+ or more)-----	7, 159	1. 1				
Boston—Sulfosalicylic acid (no data)-----	4, 536		11			
Indianapolis—Heller ring test (positive or trace)-----	5, 701	2. 2	33	10	33	10
Permanente—Sulfosalicylic acid (1+ or more)-----	3, 988	2. 3	35	16	35	16
HEIGHT, WEIGHT, BUILD:						
Alexandria, Va. 1950, 1952—Ideal weight tables ⁹ (10% variation)-----	3, 915	{ 29. 4+ 26. 2—				
Alexandria, Va. 1951—Ideal weight tables ⁹ (20% variation)-----	3, 511	{ 15. 8+ 8. 6—				
Atlanta—Standard weight tables ⁹ (25% variation)-----	213, 488					
Boston—No data (20% variation)-----	4, 536	{ 27. 4+ . 2—	347+ 0—			
Indianapolis—Ideal weight tables ⁹ ; later Pryor measurements ¹⁰ (22.5% variation)-----	5, 710	{ 13. 9+ 4. 7—	(17)	(17)		
Permanente—Ideal weight tables ⁹ (—25% and +40% from ave. for med. build)-----	3, 992	{ 9. 0+ . 03—	241	74	241	74
Richmond—Measured and recorded (no standard established)-----	(11)	(11)				
INTRAOCULAR TENSION:						
Philadelphia ¹⁴ —Schiotz tonometer (25 mm. or over)-----	9, 535	10. 2	¹⁵ 217	¹⁵ 217	217	217
Richmond—Schiotz tonometer (25 mm. or over)-----	6, 020	23. 8	65	33	130	65

See footnotes at end of table.

Table 2. Summary of tests and standards used on various multiple screening projects, with available results of screening and of cases discovered on basis of diagnostic followup reports—Continued

Test, project, description, and standard for abnormality ¹	Number of persons screened	Percent abnormal on screening	Reports received		Estimated cases found ²	
			Total cases	New cases	Total	New
HEARING—PURE-TONE AUDIOMETER:						
Alexandria, Va., 1950, 1951 (30 db loss at 4,000 cycles; 20 db at 1,000, 2,000, 6,000 cycles)-----	6, 140	22. 8				
Alexandria, Va., 1952 (20 db loss at 1,000, 2,000, 4,000, 6,000 cycles)-----	1, 267	30. 0				
Boston (30 db loss in either ear at 500, 1,000, or 2,000 cycles)-----	4, 536	8. 2	27			
Indianapolis (30 db loss at 2 frequencies in 1 ear or 1 frequency in each ear: 500, 1,000, 2,000, 4,000, 8,000 cycles)-----	5, 650	19. 8	(17)	(17)		
Permanente (combinations of 20-60 db loss)-----	3, 992	12. 6	243	92	243	92
VISION:						
Alexandria, Va.—Sight Screener ¹² (20/40 either or both eyes)-----	7, 338	26. 0				
Boston—Ortho-Rater ¹³ (Less than 20/40, near or far, either or both eyes)-----	4, 536	8. 9	65			
Indianapolis—Sight Screener (2 tests 20/40, or 1 test 20/50 either eye or both, near or distant vision)-----	5, 697	44. 5	(17)	(17)		
Permanente—Jaeger chart (Distant, 20/40; near, J-4 line either eye)-----	3, 972	23. 8	395	205	395	205
Richmond—Sight Screener (20/50 in either or both eyes)-----	7, 384	5. 5				
SELF-SCREENING HISTORY:						
Boston—222 questions similar to Cornell Medical Index-----	4, 536		16 474			
Permanente—Modified Cornell Medical Index-----	3, 994	(11)				

¹ Italicized text in stub indicates standard for abnormality.
² Estimated on basis of percent positive among diagnostic reports returned by physicians.
³ See J. A. M. A. 143: 1464-1470 (1950).
⁴ Where diagnostic reports were obtained for practically all persons referred, so that reported results represent total case finding, the figures for diagnoses returned are repeated in the columns for "estimated cases found."
⁵ See "Combined cardiovascular tests."
⁶ Includes all chest X-ray results. The 33 new cases include 6 of "active or possibly active" tuberculosis.
⁷ Includes both active and inactive cases.
⁸ Diagnoses include inactive tuberculosis.
⁹ Tables of height and weight distributed by life insurance companies derive from the medico-actuarial mortality investigation of 1912. The tables of "standard weights" are based on averages of life insurance policyholders included in that study. The tables of "ideal weights" are based on the same study but show age and weight giving the lowest mortality expectation.
¹⁰ Uses lateral thoracic diameter and bi-iliac diameter to determine body build. Method and tables of standards in: Width-Weight Tables, 2d rev. ed., by Helen B. Pryor, Stanford University Press, Stanford University, Calif.
¹¹ Not referred for this test.
¹² American Optical Company.
¹³ Bausch & Lomb.
¹⁴ Not a multiple screening project.
¹⁵ Previously known cases were not screened.
¹⁶ Number of conditions.
¹⁷ No followup.

NOTE: Where no figures are given, no data were available.

Screening vs. Diagnosis

The role of screening as a brief health examination in contrast to a complete checkup has been mentioned often in the literature, but the point is worth further emphasis. The antecedents of the screening approach are to be found in many forms of examination—com-

plete and incomplete, thorough and cursory—done for purposes of employment, life insurance, selection for military service, and school health. The deliberate combination of several rapid, simple tests for such specific purposes as case finding and health education is, however, characteristic of the present concept of multiple screening.

In the nature of the two processes and in the concepts involved, fundamental differences exist between screening and diagnosis. Screening attempts only to select high-prevalence groups through the application of standardized tests to numbers of people, with full realization that there will be "errors" in the form of false positives and false negatives. Diagnosis, on the other hand, establishes or rules out disease through a synthesis of the most complete and accurate information available about a particular individual. While each of these processes is appropriate in its place, they cannot be used interchangeably.

Important differences in details of application and interpretation naturally follow because of these fundamental differences. Screen tests are applied at random to the apparently well, whereas need for the diagnostic process is indicated in the presence of symptoms or suspicion of disease. Screening is impersonal in nature, and the result of each test is measured separately by a definite standard determined in advance and generally adhered to despite the results of other tests. Even where some subjective element enters (as in examining X-ray films for evidence of pathology) the interpreter of the test results tries not to deviate from a fairly definite set of criteria. In making a diagnosis, on the other hand, the results of tests are considered in relation to other factors, and individual judgment is an important aspect of the process. If these distinctions are not kept clearly in mind in carrying out screening, confusion results.

Deficiency and Degenerative Diseases

The fact that multiple screening is used to uncover deficiency and degenerative diseases as well as diseases caused by infectious agents poses another problem which at present does not lend itself to any perfect solution. For infectious diseases we have criteria by which screening can be judged, namely, whether the infectious agent is, or is not, present, either demonstrably or in its known biological manifestations. With deficiency or degenerative diseases, however, within the limits of our present knowledge, we are dealing with variations in physiological states that may occur normally in anyone. In this kind of situation, there is

no single "correct" standard or screening level, since we are measuring values along biological gradients, with a considerable range of normality.

Along such a scale the most accurate screen test does not usually point to definite disease as contrasted to definite absence of disease. Instead, we find a gradual transition up or down a scale from relative normality to relative abnormality. We cannot expect to determine either statistically or medically an exact point where the line between normal and abnormal is to be drawn. The problem is not one of the accuracy of tests alone. The screen test measures a particular physiological state at a given point in time, but diagnostic study is necessary to relate the finding in question to other pertinent factors in order to determine whether significant disease is actually present. That is why—be the screen test ever so accurate in measuring a condition—there is a substantial percentage of suspects whose ultimate diagnosis is negative.

As the screening level is moved further and further away from the average, smaller numbers of suspects are found, but the rate of diagnostic confirmation becomes greater. Two examples that follow illustrate concretely the manner in which this occurs. The examples are taken from results of screening 857 hospital outpatients for hypertension by blood pressure determinations, and 551 such patients for diabetes by means of the Somogyi-Nelson blood sugar test at various intervals after eating (including overnight fasting). All members of both groups received diagnostic study without regard to the screening findings.

The results found in blood pressure screening are illustrated in table 3. Here it is seen that about 70 percent of the screenees had test readings below 150 mm. systolic. Above 150 the percentages of screenees found at successively higher levels decrease rapidly until only 0.6 of 1 percent had readings of 250 and above. Referring to the third column of the table, we find that at this extremely high level 100 percent of the suspects were diagnosed as hypertensive. Reading up the column, we find successively smaller percentages of established diagnoses. With a screening level of 230 mm., 100 percent of the suspects would have been confirmed as

Table 3. Percentage distribution of blood pressure readings on screening, and corresponding percentages of persons diagnosed as hypertensive¹

Systolic blood pressure reading (mm.)	Percent of persons with indicated reading at screening	Percent in each group diagnosed as hypertensive
70-89-----	0.3	0
90-109-----	14.2	0
110-129-----	33.6	3
130-149-----	21.6	26
150-169-----	14.8	52
170-189-----	7.5	78
190-209-----	4.4	89
210-229-----	2.0	94
230-249-----	1.0	100
250-269-----	.6	100
Total-----	100.0	-----

¹ Data from a cooperative screening project at the District of Columbia General Hospital, Washington, D. C., results of which have not yet been published.

positive, but a great many cases would have been missed. Conversely, if the screening level is lowered in an attempt to pick up additional cases, smaller and smaller percentages of confirmations will be obtained, and the cost of finding these cases will involve the referral and examination of many persons representing false positive tests.

A second example, using blood sugar values, is shown in table 4, where a striking parallel to table 3 is seen. Again we find decreasing percentages of suspects if successively higher values are considered as screening levels. Accompanying these decreasing percentages, the proportions of confirmations of diabetes increase from 0 for persons screened at less than 70 mg., up to 100 percent at 200 mg. per 100 cc. and over. The same reciprocal relationship is evident here as was pointed out in the preceding example. Lowering the screening level makes it necessary to process larger and larger groups of suspects with a decreasing rate of confirmation.

"False-Positive" Results

In populations where the prevalence of a disease is low, furthermore, significant percentages of false positives must be expected in screening, even where measurements along a range of values, or gradient, may not be involved. Suppose, for example, that screening is being done for a disease actually present in

Table 4. Percentage distribution of blood sugar values on screening, and corresponding percentages of persons diagnosed as diabetic¹

Venous blood sugar value (mg. per 100 cc.)	Percent of persons with indicated value at screening	Percent in each group diagnosed as diabetic
30-49-----	0.4	0
50-69-----	12.5	0
70-89-----	51.5	.4
90-109-----	22.5	7
110-129-----	4.7	11
130-149-----	2.5	29
150-169-----	1.8	60
170-199-----	1.1	67
200-299-----	1.5	100
300-399-----	1.1	100
400-499-----	.4	100
Total-----	100.0	-----

¹ Data from a cooperative screening project at the District of Columbia General Hospital, Washington, D. C., results of which have not yet been published.

only about 2 percent of the screenees. In such a situation, let us assume a typical population of 1,000 persons, among whom 20 have the disease in question. Let us also assume a screening test which, applied to this group, will screen out 19 of the 20 diseased persons and only 19 others. Nineteen of these positives will then be verified by diagnosis and the other 19 will be diagnosed negative. Thus, 19 out of 38 screen positives are false, giving a "false-positive" rate of 50 percent. It would be a mistake, however, to condemn the screen test itself for this rate. Actually, a false-positive rate calculated in this manner is misleading, unless allowance is made for the fact that the rate depends on the prevalence of disease in the population screened. Nineteen of the twenty persons with the disease were properly classified by the test, and, therefore, sensitivity in this example is 19/20 or 95 percent. The specificity is 961/980, or 98 percent, since 961 of the 980 persons without the disease were correctly classified. Thus the screen test must be acknowledged to be highly efficient.

Planning the Project

The problems illustrated here lie at the root of much confusion regarding tests and standards, and have even cast doubt upon the feasibility of the screening approach in general. However, the same situation is faced in screen-

ing by any method that yields a wide range of values or deals with conditions of relatively low prevalence. It is more realistic and more productive—and in accord with medical traditions—to seek practical solutions to such problems, rather than to surrender for lack of perfect solutions.

Practical solutions must be sought in terms of the work involved in retesting and referral, the diagnostic workload that results from screening and retesting at any given level, and the resources required to meet the resulting diagnostic and care problems, as well as the costs incurred at each stage. The psychological effects upon the screenee cannot be overlooked. Particular care must be taken not to give him a false sense of confidence in the results of the screening test: He should be aware from the beginning that the screening is not a substitute for a complete health examination and that he is being tested for only certain specific conditions. Each local situation must be studied in the light of the possible effects of false positives and false negatives upon medical practice and on public reaction.

The local physicians and heads of clinics or hospitals, who will be expected to diagnose and treat the various conditions, should be included in the planning so that standards for screening, procedures and facilities for referral, diagnosis, treatment, rehabilitation, and education will be coordinated and have meaning for all concerned.

This cooperative planning should also deal with the problem of the person without frank disease who may have an abnormal condition in an early or incipient stage. Although frequently mentioned in the literature, such cases have not always been dealt with adequately in connection with screening programs. Decisions as to how this problem is to be handled have important implications for early case finding, for management of screenees and patients, and for the health education to be accomplished throughout the entire project. As indicated above, we can no longer think only in terms of the presence or absence of disease when dealing with deficiency and degenerative diseases. Many of the persons falling between the definitely normal and the definitely abnormal will not be regarded by their physicians as needing

medical supervision in the usual sense. The physician may, however, want to follow them because of the possibility of subsequent development of frank disease.

The objectives of a screening project should not only be discussed thoroughly and agreed upon definitely by those concerned, but should be expressed clearly in writing to avoid the possibility of later misunderstandings. Two major objectives—direct service to the public, and research—may be involved. If they are combined, each of these objectives will exert a limiting influence upon the other. Definite decisions as to the relative emphasis to be given to direct service and to research should be made in advance.

The kind of thorough planning indicated here for multiple screening and its ramifications will, of course, be familiar to those with experience in the public health field, since counterparts of the problems involved are found in the development of any public health program.

Evaluation of Multiple Screening

Although much progress has been made, multiple screening is still in an evolutionary stage. Screening and followup programs for syphilis and tuberculosis have been highly developed, but this is not true of screening for other diseases or for groups of diseases. Much remains to be learned through evaluation of multiple screening, in terms of accomplishments and costs of procedures to be followed at various stages from the original screening through the entire followup.

In the final analysis, of course, screening can be evaluated only by its results, such as reduced morbidity, disability, or mortality. Its ultimate value in the local community will be achieved as it becomes an integral part of a well-rounded chronic disease program, but on a limited scale multiple screening can serve to stimulate and guide the evolution of such a program.

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A complete bibliography on multiple screening may be obtained upon request to the Publications Section, Division of Chronic Disease and Tuberculosis, Public Health Service, Washington 25, D. C.

Psychiatric Rehabilitation in the Hospital

By RICHARD H. WILLIAMS, Ph.D.

THE CONCEPT of rehabilitation is fairly clear-cut when one is dealing with amputees or with persons suffering from chronic neurological diseases. Everyone knows what is meant, and the results have been striking. But as the concept has become more generalized and is used to refer to still other diseases, including mental illnesses, it is not quite so clear.

Dr. Pearce Bailey has stated, "The current rehabilitation movement . . . is rooted in the concept that the mission of modern medicine must extend beyond definitive medical treatment to a program of dynamic therapeutics designed to bring the chronically ill patient to the highest functional level of physical, psychological, and socioeconomic adjustment compatible with his disability" (1). Such a program is limited only by maximal development of residual functions.

This statement is clear as to the objectives of rehabilitation. It is not, nor was it intended

to be, a definition because it does not delimit the process or operations involved. Furthermore, in a broad sense, all therapies have this same goal and may contribute to its realization. There has been considerable difficulty in demarcating a specific field of activities to be termed "rehabilitation," and there is some tendency to feel that rehabilitation is too loose a concept to warrant the development of a special program. On the other hand, there is a strong feeling that the goal of maximal development of residual functions requires a new orientation, the development of new techniques, and a new program if it is to be adequately attained.

The Rehabilitative Process

Several characteristics tend to distinguish the activities of people engaged in rehabilitation. A rehabilitation worker is often said to engage in adjunctive therapy as contrasted with specific medical therapy. Specific medical therapy is designed to cure, arrest, or mitigate a specific disease entity. Adjunctive therapy assumes an end product of specific therapy and is designed to restore or readjust the patient to the most adequate level of functioning of which he is capable, given this end product.

Dr. Howard A. Rusk's frequently used phrase "the third phase of medicine" also suggests a distinguishing characteristic of rehabilitation in terms of time. The rehabilitative process generally begins after diagnosis has been made and specific therapy used. It might be better to distinguish four phases of medical practice: prevention, diagnosis, specific treatment, and

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rehabilitation. To be sure, no very sharp lines can be drawn in terms of time. All phases may overlap in many cases. Yet these phases are distinguishable, with general, average differences in time as one of the variables.

Another distinguishing characteristic of the rehabilitation process is that, in addition to the various adjunctive therapies which will vary from case to case, a complete approach must be used. The patient must be understood as a whole person in relation to his family, community, and job possibilities. As Rusk has stated, "If a man has a hearing disability, has lost a leg, or has a cardiac condition, his disability affects all phases of his life. It has a bearing on his vocational opportunities, his family, his social life, his recreation, and his mental and emotional outlook. Individual disabilities cannot be treated in rehabilitation; the whole man must be treated" (2).

At a discernible point the patient begins to get an "outside" orientation, and to think of himself as an "ordinary social person" rather than as a "patient." There is a problem of the best time and means to get him to this point and to keep him oriented. Also, there is a problem of getting the patient "over the hump." In other words, there are critical points in the total treatment process which need special attention. A part of the hump which the patient must get over results from the gap which generally exists between hospitals and the community. There is a problem of how or in what ways this gap may be bridged.

In short, patients have many needs which have not been wholly met in the traditional therapies. There is a problem, then, of determining what services can meet these needs and the kinds of people with necessary training required to perform them. Among these needs the patient's occupational role and other aspects of his social role are particularly important.

We suggest that "therapy" and "treatment" may be used as generic terms, and that rehabilitation is a special form of therapy, albeit relatively nonspecific and holistic in its approach. Rehabilitation is that form of therapy which is primarily concerned with assisting the patient to achieve an optimal social role (in the family, in a job, in the community generally), within his capacities and potentialities. Psychiatric

rehabilitation is the application of rehabilitative therapy, thus defined, to mental and emotional disabilities. These disabilities may be primary or secondary. In its developmental research program, the National Institute of Mental Health began with the primary disorders—the psychoses.

Treatment a Continuum

Total treatment may be viewed as a continuum, with specific medical therapies defining one end of the scale and rehabilitative therapies defining the other. The specific medical therapies are primarily (but not exclusively) concerned with helping the patient to recover from his illness. The rehabilitative therapies are primarily concerned with helping the patient live with his illness or its residue and helping him develop substitute capabilities and new adjustments as needed. The nearer one is to the specific medical therapies on such a scale, the more one is concerned with operations within a distinctly medical and protective setting. The nearer one is to the other end of the scale, the more one is concerned with the patient's ultimate adjustment in nonmedical settings in the community. In the field of mental disorders, at one end of the scale (deep psychotherapy) one is concerned with remodeling the patient's basic character structure, whereas at the other end of the scale, the primary concern is getting the patient to function in the social process, with the character structure which he has.

These two orientations do and should shade into each other in the total process of treatment. There is no sharp division between them on a basis of time, as it may be highly advantageous to develop the rehabilitative aspects during an early stage of treatment. There is no 1 to 1 correlation between type of personnel and type of treatment on this continuum. Psychiatrists can, and should, concern themselves with the full range of treatment problems, including rehabilitation. By and large, personnel concerned primarily with rehabilitation do not have the required training to engage in specific medical therapies, although it is advantageous if they have some understanding of these therapies and can communicate easily with physicians. Some therapists, notably occupational therapists, occupy an intermediate

position: to facilitate the specific medical therapy, as prescribed by a physician, and to facilitate the rehabilitation process. Possibly the term "adjunctive" therapies will be gradually dropped, because it gives the impression of something added on, secondary and expendable. They might better be called rehabilitation services and considered as an integral part of total treatment.

The Importance of Research

Research in the field of psychiatric rehabilitation is in its infancy, but it has great potential importance for two basic reasons. In the first place, research is important operationally because it can lead to significant reductions in costs and wastage in the care of the mentally ill. As is well known, mental patients occupy more than one-half of our hospital beds, and the population in mental hospitals continues to increase—17 percent since 1939. There are a few private psychiatric hospitals, which provide good treatment and care, but they cannot possibly assume the whole burden of this large public health problem. State mental hospitals are generally overcrowded, and they are seriously understaffed.

There is considerable doubt as to the extent, if any, to which this increase is due to increases in the incidence of psychiatric disorders. Certainly, one of the major factors has been a series of changes in the organization and structure of the family, together with an increase in numbers of individuals who are detached and isolated from family groups. All of this has made it more difficult to tolerate and care for the mentally ill at home, individually and independently. Improved medical care has also reduced mortality rates in mental hospitals. Thus, the trend is toward higher admission rates and longer stay in the hospital, so that a large chronic population has developed.

It is not likely that a sufficient number of psychiatrists can be trained in the near future to meet the needs of the mentally ill for specific medical therapies. Given this situation, there is urgent need for research to determine the best ways to:

1. Prepare mental patients to live in less sheltered, less dependent, and less costly settings than the hospital.

2. Utilize all the hospital personnel, including psychiatric aides who have the most frequent contacts with patients, and utilize the entire hospital setting as a community to this purpose.

3. Mobilize existing resources in the community and create new, but less expensive, resources to maintain patients at an adequate level of functioning after they have left the hospital.

In the second place, research in psychiatric rehabilitation has a potentially significant contribution to make to basic scientific knowledge about mental disorders. Bailey (1) points out that the pathogenesis of neurological diseases is less well known than for other diseases. Hence there is more limited use of specific therapies and rehabilitation becomes all the more important. This statement applies equally well to mental illnesses. Furthermore, mental disorders, regardless of etiology, tend to involve disturbances in interpersonal relations and social adjustments in a direct way, more so than in most other illnesses. A significant proportion of mental disorders involve a failure of a person's system of behavior itself, rather than an inhibition of the system imposed by conditions stemming from the anatomical or biochemical systems of the organism—the "actor" is out of "whack," but the organism may be perfectly intact. Communication with others and emotional orientation to others are disturbed.

Rehabilitation of the mentally ill must thus be based primarily on an understanding of the emotional components of personality in the network of interpersonal relations, or, in other words, on the dynamics of social motivation. Research in psychiatric rehabilitation focused, as it must be, on ways in which patients may achieve an adequate social role and adequate functioning in the community, ways in which they may regain some interpersonal and social perspective, should contribute significantly to a basic understanding of this important component in mental disorders.

A Pilot Study

The National Institute of Mental Health is currently sponsoring a pilot study in rehabilitation at the Boston State Hospital under the

general guidance of the superintendent. A research psychiatrist is project director, and psychologists, sociologists, and social anthropologists are used on the research and advisory staffs of the project. It is now in its second year of operation. Operations were necessarily on a small scale during the first year, and it is expected to run at least 2 more years.

The study encompasses an experimental group and a control group, with 30 men and 30 women in each group, selected from the reception service wards, and experimental and control groups, with 40 men and 40 women in each group, selected from the chronic service wards.

Control patients receive whatever service the hospital is conventionally able to provide, which is minimal. For example, on the chronic service wards for men there are 2 social workers, 3 occupational therapists, and 1 recreational therapist to cover the needs of 700 or more patients.

The experimental groups receive additional rehabilitation services from personnel assigned directly to the pilot study and from regular hospital personnel. These services include recreational therapy, educational therapy and counseling, hospital industry counseling, the services of a full-time vocational rehabilitation counselor, occupational therapy and social service. Also, an explicit attempt is made to bring physicians, nurses, and ward care personnel into the rehabilitation team.

However, the project has been explicitly designed with a relatively small number of additional service personnel (there are only four full-time service personnel attached to the project). We are convinced that rehabilitation services do pay off and that it is not necessary to make large additions to service costs. When the project was expanded in scope for the second year, additional research personnel but not service personnel were provided. The addition of research personnel bears a relation to "capital gains" to be derived from a project of this sort, which is quite different from the situation created by the addition of service personnel. Costs of additional service personnel would continue indefinitely in duplicated projects, whereas other hospitals can use the knowledge gained without having research costs. The

latter is a primary objective of the project.

Definitive results are not yet available. Indeed, definitive results cannot be expected for at least 2 more years, because one of the criteria must necessarily be the extent to which patients can maintain themselves more independently over a period of time. Some experts consider 5 years to be a minimum period for making this judgment. The project has, however, learned much about methods of research in rehabilitation and about operational problems which are likely to be encountered. This is a type of knowledge which would be very useful to persons who might wish to introduce either research or service programs in other hospitals.

Considerations of Method

In a pilot research study, considerable time and effort must be spent to determine the methods of research which will be feasible within a given setting and which will most probably answer significant questions. In fact, one of the major purposes of a pilot study is to do just that and to pave the way for further and more detailed research. Six months were allowed for this purpose alone in the Boston State Hospital study before any of the action programs were initiated. As was expected, further experimentation with, and revision of, methods were necessary after the 6-month period.

Three major considerations of method, which would have to be faced in any study of a treatment program, have been explored:

1. Establishing experimental and control groups and the criteria for selection of patients in each.
2. Defining the variables to be measured or otherwise analyzed.
3. Selecting or developing tools for measurement or evaluation to obtain baseline data and later comparisons.

Selection of Groups

The establishment and composition of experimental and control groups on the reception service wards presented no serious difficulties, because existing administrative practices could be readily used for this purpose. This service has 6 similar wards in a 3-story building. The

2 wards, one for men and the other for women, on the third floor were arbitrarily chosen for the experimental patients, and the 2 wards on the second floor, for controls. Patients are assigned to these wards by rotation on admission, so that the composition of the group is determined by chance. Only committed and voluntary patients were chosen, patients for whom there is no arbitrary limit on hospital stay, thereby excluding certain other categories which are admitted for restricted periods of observation. However, if patients in these other categories were subsequently transferred to a committed or voluntary status they were involved in the study. The groups are thus composed of the first 30 patients on committed or voluntary status to be admitted to experimental or control wards, starting November 1, 1952, making a total of 120.

The establishment and composition of experimental and control groups from the very large chronic population presented numerous problems. Development of feasible and suitable means to solve these problems was a major accomplishment of the study during the first months. The final result has utilized five major steps:

1. An "eligible group," was designated according to the basic criteria of: (a) not under current treatment for physical illness; (b) under 60 years of age; (c) hospitalized for at least 1 year in the current illness. These criteria do not imply that excluded cases are incapable of profiting from rehabilitation services, but only that they involve different problems in rehabilitation, and we wished to focus the study more specifically.

2. "Prospects" were designated within the eligible group. Prospective patients for rehabilitation services were selected by the chief psychiatrist of the service on the basis of his personal knowledge of patients, a check on patients recommended as prospects by other service personnel, and a careful screening of all patients on ground parole. Severity of illness, potential responsiveness to treatment, and potential for achievement after discharge were all considered. It was specifically decided to include some of the more seriously ill patients, whose chances for being discharged within 1 year would be slight, because one of the aims

of the study is to determine what types of mental patients can best profit from rehabilitation services, and, consequently, the range of types should not be arbitrarily narrowed in advance.

3. A "drawing group" was obtained by cross-classification of all prospects by the three criteria mentioned above. Each patient was rated on a three-point scale for each criteria. Twenty-seven cells were thus formed, and a random selection of patients from each cell, in proportion to the numbers in each cell, was made to obtain a drawing group of 40.

4. The 40 members of the drawing group were matched with 40 members of the remaining prospects, according to 10 indexes.

5. Members of the 40 matched pairs were assigned to experimental and control groups by chance.

Analysis of the data after the selection was made indicates that "eligibles," "prospects," and study groups are very closely comparable in terms of level of hospital adjustment, so that we are most probably dealing with a broadly representative sample of chronic patients. About 80 percent of the prospects manifest an active paranoid or schizophrenic process. Also, it was possible to achieve very close matching between experimental and control groups. It was desired to develop methods of selection for the study which can be duplicated, which will not deviate markedly from hospital administrative practices, and which do not involve the use of complicated or expensive instruments (the validity of which has not been proved for rehabilitation, in any case). The method established came closest to satisfying all these considerations. Its feasibility, however, is dependent upon having a chief psychiatrist who has had sufficiently long contact with the patient group and who can be given the extra time necessary to make the selection of "prospects" from "eligibles."

Defining the Variables

Defining the variables to be studied also presents a crucial problem in any research program in rehabilitation. In a sense, our major variable is the introduction of a rehabilitation program in the experimental groups (and its

nonintroduction in the control groups), but it is apparent that this is a very complex variable indeed. Several rehabilitation techniques are being used. Also, and probably more important (for reasons to be indicated in another section), the study itself introduces new problems, new attitudes, and new interpersonal relations for all of the personnel. The problem of contamination of control groups is very real, especially in relation to the new attitudes which the study may generate. It would not be possible, short of an enormously complex and costly design, to isolate each aspect of the overall variable, a rehabilitation program, and study it separately under strictly experimental conditions. We do believe it is both feasible and potentially valuable to maintain the overall experimental design and then to develop accurate descriptions of the subvariables and intervening variables involved. For this reason primarily two full-time sociologists were added to the project staff. Undoubtedly, numerous subhypotheses will develop concerning the rehabilitation program which will lend themselves to scientific analysis now and possibly to experimental testing in subsequent studies.

Evaluation Tools

The selection or development of tools for measuring and evaluating the patients' status and movement is largely a problem of providing sufficient time and personnel to give a series of psychological tests and to use a number of rating devices. We are exploring a new field of developmental research, and we are not sure which psychological tests have adequate predictive value for rehabilitation potential. Several rating scales of hospital and post-hospital adjustment have been developed in quite recent years, but further exploration is necessary to determine their usefulness in a particular research setting. Thus, within reason, the more instruments used, the better. Some of them will turn out to have sufficient reliability and validity to be useful and others can be discarded later on.

A battery of 7 or 8 psychological tests and several rating scales, some of which can be used under careful supervision by personnel engaged in ward care, are currently being used. Con-

sultant psychologists and an additional full-time psychologist were added to the staff of the study to strengthen this aspect of data collection. In addition, detailed records are kept of the type and amount of the services given to experimental patients. It has been recognized from the first that a better in-hospital adjustment can be a legitimate goal in rehabilitation, and a legitimate criterion of success of the program, even though the patient may not be ready for discharge. Not only is the patient "better off" in terms of broadly accepted human values, but also he creates less demands on the hospital staff, thereby lowering the costs of his care. Consequently, periodic ratings are necessary, and it would be misleading to rely on discharge rates as the sole index or even to give them special weight.

Some Operational Problems

Numerous operational problems will be encountered whenever a new program is introduced into a large organization such as a State mental hospital. Both the formal administrative organization and the informal cultural atmosphere are likely to possess a certain rigidity and to be resistant to change. Two rather different attitudes may be taken toward such problems. On the one hand, they may be, and without great care are likely to be, regarded as "unenlightened" resistances to be overcome by all possible means. On the other hand, they may be regarded as representing very real forces in the social structure of the hospital, probably having important functional aspects, and, consequently, something to be understood, possibly modified, but not simply combated. The latter point of view has prevailed, wisely, we believe, in the Boston study.

Several of the operational problems encountered thus far revolve around the role of the ward physician. In the early stages of the study, it appeared that ward physicians were not making referrals for rehabilitation services (especially on the reception service wards) as frequently as would be expected or desired. Analysis showed that this was not due to blindly negative attitudes on the part of the physicians. They had suddenly been called upon to make a new type of referral and new

evaluations of patients for which they had not been prepared in their training, and no established routines existed. Also, examination of schedules revealed that the ward physicians did not have the necessary time to do the things they are supposed to do, according to general expectations. Furthermore, ward physicians are residents and are oriented toward their own training programs, which are heavily slanted in the direction of individual psychotherapy with patients (as a rule, with patients who are not on the same wards). The new rehabilitation program appeared as an additional hospital chore, taking valuable time away from training rather than adding to the value of the total training experience. The statement was made in a staff conference, for example, that if residents had a completely free choice they would not choose assignment to the experimental wards. Group conference techniques can, and have done, much to alter this pattern gradually, but it is deeply entrenched in the hospital culture and will have to be realistically faced in any rehabilitation program.

This example is but one of many of the general problems of facilitating communications and integrating a new program within the hospital. It has become a major goal of the pilot study to understand this problem as thoroughly as possible, rather than to treat it as a negative condition to be overcome, allowed for, or just tolerated. Such an orientation would certainly make it much easier to duplicate, in other hospitals, those phases of the action program which prove worthwhile.

Some Results From the Data

As indicated previously, definitive results in the sense of evaluating the rehabilitation program as such cannot be expected in the first years of a pilot study. However, such a study does produce other kinds of results in the form of new knowledge that is useful for a variety of purposes. Sometimes the facts may not be entirely new or unknown, but the research on a new problem lends new perspective to them, or gives them a greater emphasis than they had before. A few examples of areas of knowledge gained thus far in the Boston study are cited briefly to illustrate.

The hospital has been more accurately informed concerning what has actually been going on in terms of releases. It was necessary for the pilot study staff to make statistical analyses of releases during a sample year, giving numbers released, location within the hospital prior to release, length of hospitalization, age, sex, type of provision for care on release and returns to the hospital.

The reception service handles "new" admissions, but it does not follow that these patients have recent or acute cases. In fact, less than 50 percent of this group in the pilot study had come into the hospital for the first time. Some of them had as many as nine previous admissions to mental hospitals. It is a group representing a very wide range of problems in development and testing a rehabilitation program.

On the first trial run of selecting prospects among chronic patients from the eligible group, it was found that a surprisingly high proportion (roughly, 70 percent among the men) of the prospects had serious organic deficits along with their mental illness, including mental deficiency, alcoholism with organic residuals, and various pathologies of the central nervous system. On the other hand, they were people who caused little trouble in the hospital and who had made a reasonably good hospital adjustment as evidenced by ground parole and ability to perform some tasks in hospital industries. Further analysis raised serious doubts about their potential for adjustment outside of the hospital. Rehabilitation efforts in this direction might simply result in the transfer of a custodial problem from the hospital to some outside group. In any case, the group with serious deficits represents different and additional rehabilitation problems. Yet this is the group that hospital personnel tended to think of first as prospects for rehabilitation. These facts show that the selection of patients for intensive rehabilitation efforts is not a simple matter. In the Boston study there was need to broaden the base of selection so that an analysis could later be made of the most successful and the least successful types of cases.

It is known that the percentage of married patients in mental hospitals is low in comparison with the general population, but the extent of this difference is not often realized nor is its

importance sufficiently emphasized. About 70 percent of the male chronic prospects in the Boston study were "single." Thus, relations with a "family of procreation," that is, with a family in which one is a major responsible member (for example, husband and father), cannot be a part of the rehabilitation plan for many mental patients. The extent of the relation, and its potential usefulness, to a "family of orientation" (parents, siblings, or other relatives) is important to determine, as is the possibility of finding substitute groups for the family in many cases.

Interpersonal Relations and Attitudes

Charlotte Green Schwartz (3), in an analysis of the literature on the rehabilitation of mental hospital patients, draws an important distinction between rehabilitation programs which focus primarily on the interpersonal relations and attitudes which come into play and result from activities in the program, and programs which focus primarily on the nature of the activities themselves. The latter emphasis tends to give major attention to the individual patient and the particular activities (for example, occupational therapy and recreational programs) in which he has engaged, whereas the former tends to give major attention to the whole context of social participation in activities regardless of their specific nature. The evidence is not all collected concerning the relative values of these two approaches.

The definitions and general perspectives on psychiatric rehabilitation, suggested above, in which the dynamics of social motivation and social reactivation are crucial, would favor the hypothesis that interpersonal relations and attitudes are more important than the intrinsic nature of the activities themselves. Sociological research in other areas, such as industry or the armed services, give credence to this hypothesis (4, 5). If proved generally valid, it would have important implications for the development of training programs for rehabilitation personnel. Perhaps what is needed is a generic program which has major emphasis on social and psychological dynamics and provision for internships in which dynamic principles could be applied. In addition, there could

be some specialization within the generic program on activities such as crafts, manual arts, music, drama, vocational development, and adjustment.

The Mental Hospital as a Social System

There is growing awareness that the patterns of interpersonal relations and attitudes within an organization such as a hospital form a system, and that this system has profound effects upon all the participants. It controls and motivates their behavior to a very significant degree. Again, there is much sociological evidence concerning the nature and importance of this system in other fields, particularly industry and the armed services (4, 5). Schwartz (3) analyzes some of the quite recent studies of the social structure of the mental hospital, studies which are most challenging indeed. She also indicates, on the basis of evidence thus far, some of the characteristics of social structure which are presumed to be rehabilitative or vice versa, such as degree of democratization, effectiveness of channels of communication, and clarity of definition of functions.

One of the broadest visions of this range of factors and their potential therapeutic value has been developed by Dr. Maxwell Jones and his co-workers in England (6). They have also made one of the most explicit and thorough applications of these concepts in practice. A program for rehabilitation of the chronic unemployed with psychiatric difficulties has been established in the industrial neurosis unit at Belmont Hospital. So-called psychopaths and others with various disorders of character, usually termed "hopeless" cases, have been treated with better than expected success. This group is convinced that individual psychotherapy and hospitalization alone are not enough and that every aspect of the patient's life in the hospital community can and should be part of the total treatment program. Extensive use is made of conferences, discussion groups, psychodrama, and other forms of group participation. Explicit attention has been paid to the roles of physicians, nurses, and others on the staff and to the patterns of interpersonal relations and emotional dynamics which grow up around these roles. The constant aim is to integrate

these roles and to draw the patient into the total pattern, as a "therapeutic community," so that he can function more adequately in his social roles after discharge.

As this group clearly recognizes, every hospital has its social system, but much of it has been established on an intuitive or empirical basis, or has grown by the accretion of traditions. Efforts to direct the energies of the social system into therapeutic, including rehabilitative, channels should prove immensely fruitful. We are perhaps looking beyond the solid acquisitions of research, but we believe we are looking in a direction to which research already points the way.

Summary

Rehabilitation has been defined as that form of therapy which is primarily concerned with helping the patient to function optimally in society, within his capacities and potentialities. Research on psychiatric rehabilitation has high potential value, both in relation to programs of treatment and in relation to basic scientific knowledge about mental disorders.

In a pilot study of psychiatric rehabilitation in the hospital, much has been and is being learned concerning methods of research, operational problems encountered, and various facts about the population of a mental hospital.

The importance of interpersonal relations and attitudes and the value of mobilizing the forces in the social system within the hospital for therapeutic purposes have been emphasized.

We believe we are entering a period in which this type of knowledge will be increased, and operational procedures for its use will be thoroughly established. It should be a period in which significant gains are made in the treatment of the mentally ill and in an understanding of mental disorders.

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Details of the procedures used in selecting experimental and control groups from the chronic service wards can be supplied interested persons on request to the author.

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Dr. Brownell Named Commissioner of Education

Dr. Samuel M. Brownell, 53, widely known educator, was named Commissioner of Education in the Department of Health, Education, and Welfare by President Eisenhower on October 14, 1953. He will succeed Dr. Lee M. Thurston, who died September 4, 1953, after having been in office for only 2 months.

The new chief of the Office of Education has been president of the New Haven State Teachers College in Connecticut since 1947 and professor of education administration at the Yale Graduate School since 1938. Dr. Brownell also has been a visiting lecturer in educa-

tion at the Universities of Cornell, Harvard, Michigan, Southern California, and Wisconsin. A native of Peru, Nebraska, he was a graduate of the University of Nebraska in 1921. He received his doctorate at Yale in 1926 and for 9 years was superintendent of schools at Grosse Point, Michigan.

Dr. Brownell is president of the division of higher education of the National Education Association and has been a frequent contributor of articles to professional journals.

Industrial Sickness Absenteeism

Rates for Specific Causes in 1952 for the year and last two quarters

Year 1952 Men and Women

The 1952 rate for sickness and nonindustrial injuries among men is approximately the same as for 1951—130.9 and 131.2 absences per 1,000 men, respectively. With only a few exceptions, the 1952 rates for specific causes and the corresponding 1951 rates do not differ greatly (table 1).

Among women, the 1952 overall rate of 344.9 is 9 percent above the 1951 rate of 315.1. The rate for the nonrespiratory-nondigestive disease group is 27 percent above the 1951 rate.

A comparison of the rates for men and women in the broad cause groups shows that rates for women in the respiratory and the nonrespiratory-nondigestive groups are approximately three times the corresponding rates for men. For nonindustrial injuries and the digestive group the rates for women are only about half again as large as the corresponding rates for men. On the other hand, the men employees had higher rates than women in 1952 for tuberculosis of the respiratory system; diseases of

the stomach except cancer; hernia; and diseases of the heart.

Years 1943-1952

An inspection of the previously published year-to-year rates for the 10 years, 1943-52, disclosed for both men and women an upward trend in the frequency of sickness and nonindustrial injuries that began in 1950 and continued through 1952. The upward trend among women was more pronounced than among men. Indeed, the 1952 rate for women (344.9) was the highest of the 10 annual rates, exceeding the 10-year average (262.2) by 32 percent.

Frequency by Duration

During 1952 approximately 7 of every 1,000 men and 8 of every 1,000 women experienced an illness that caused them to be away from work for more than half of the year (table 2). These absences were due primarily to nonrespiratory diseases. For both men and women only one-fifth of the respiratory absences lasted more than 1 month, whereas, more than one-half of the nonrespiratory absences lasted more than 1 month.

Days of Disability

The disability rate of 6.6 days per man in 1952 corresponds closely with the rate of 6.4 in 1951. Women averaged 13.2 days of disability in 1952 compared with 11.9 in 1951, approximately twice as many days of disability as the men. Among both the men and women, more than half of the lost time was due to nonrespiratory-nondigestive diseases (table 3).

Prepared by W. M. Gajafar, D.Sc., in charge of the statistical services of the Division of Occupational Health, Public Health Service, this report continues the series on industrial sickness absenteeism. Data are derived from periodic reports of industrial sick benefit organizations and are limited to sickness and nonindustrial injuries causing absence from work for more than 1 week. The report for 1951 and the first half of 1952 appeared in Public Health Reports, March 1953, pp. 353-357.

Table 1. Absences per 1,000 persons by cause—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—years 1952, 1951, and 1943-52 ¹

Cause ²	Number of absences per 1,000 persons beginning in specified period					
	Males			Females		
	1952	1943-52 ³	1951	1952	1943-52 ³	1951
Sickness and nonindustrial injuries.....	130.9	123.2	131.2	344.9	262.2	315.1
Percent of female rate.....	38	47	42	263	213	240
Percent of male rate.....						
Nonindustrial injuries (169-195).....	16.0	13.0	15.9	23.2	17.8	19.2
Sickness.....	114.9	110.2	115.3	321.7	244.4	295.9
Respiratory diseases.....	37.9	43.0	41.7	130.4	107.8	136.7
Tuberculosis of respiratory system (13).....	.7	.7	.6	.4	.5	.5
Influenza, grippe (33).....	11.8	16.3	16.1	31.0	35.6	52.7
Bronchitis, acute and chronic (106).....	5.6	6.9	6.2	12.8	11.5	11.1
Pneumonia, all forms (107-109).....	5.4	5.3	5.8	5.5	4.4	7.7
Diseases of pharynx and tonsils (115b, 115c).....	3.9	4.5	3.6	17.7	16.4	14.8
Other respiratory diseases (104, 105, 110-114).....	10.5	9.3	9.4	63.0	39.4	49.9
Digestive diseases.....	23.3	19.2	22.3	36.9	32.2	34.6
Diseases of stomach except cancer (117, 118).....	7.2	6.2	7.0	4.5	3.8	4.5
Diarrhea and enteritis (120).....	3.4	2.5	2.9	12.0	7.3	9.6
Appendicitis (121).....	4.0	4.0	4.5	6.4	10.9	9.4
Hernia (122a).....	3.7	2.7	3.4	.8	.7	.2
Other digestive diseases (115a, 115d, 116, 122b-129).....	5.0	3.8	4.5	13.2	9.5	10.9
Nonrespiratory-nondigestive diseases.....	51.0	44.3	48.1	148.9	99.1	117.6
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) ⁴	4.5	2.9	3.7	24.6	9.0	13.6
Cancer, all sites (45-55).....	1.0	.7	1.1	1.1	.7	.9
Rheumatism, acute and chronic (58, 59).....	3.6	4.4	3.5	5.7	4.7	4.4
Neurasthenia and the like (part of 84d).....	1.6	1.9	1.7	16.9	13.1	16.1
Neuralgia, neuritis, sciatica (87b).....	2.0	2.6	2.2	4.0	3.0	2.8
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	2.3	1.9	2.1	5.6	2.6	3.4
Diseases of heart (90-95).....	5.6	4.7	5.3	2.1	2.3	1.8
Diseases of arteries and high blood pressure (96-99, 102).....	2.4	2.3	2.3	2.0	1.5	1.5
Other diseases of circulatory system (100, 101, 103).....	5.7	4.4	4.9	10.1	6.7	7.2
Nephritis, acute and chronic (130-132).....	.4	.4	.4	.2	.4	.4
Other diseases of genitourinary system (133-139).....	5.3	3.7	4.8	31.9	23.0	30.5
Diseases of skin (151-153).....	4.0	3.6	3.6	6.6	5.7	4.9
Diseases of organs of movement except diseases of joints (156b).....	3.8	3.6	3.6	10.6	6.9	9.7
All other diseases (56, 57, 60-79, 88, 89, 154, 155, 156a, 157, 162).....	8.8	7.2	8.9	27.5	19.5	20.4
Ill-defined and unknown causes (200).....	2.7	3.7	3.2	5.5	5.3	7.0
Average number of persons.....	176, 235	2, 189, 728	173, 853	15, 890	209, 468	15, 154

¹ Industrial injuries and venereal diseases are not included. ² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939. ³ Average of the 10 annual rates. ⁴ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

Men
Last Half
1952

During the last half of 1952 the sickness absenteeism rate among men employees for the third quarter was 103.8 per 1,000 men and for the fourth quarter, 123.1.

While the fourth quarter rates are generally higher than those for the third quarter, the rates for 1952, for either quarter, are remarkably similar to the corresponding rates for 1951 (table 4).

Table 2. Absences per 1,000 persons by duration—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—year 1952

Duration of absence in calendar days	Sickness and non-industrial injuries ¹		Nonindustrial injuries		Respiratory diseases		Nonrespiratory diseases ²	
	Males	Females	Males	Females	Males	Females	Males	Females
8 or longer.....	149.9	347.0	15.3	23.6	43.9	127.7	90.7	195.7
8-28.....	87.4	207.6	8.3	12.1	35.4	102.1	43.7	93.4
29-56.....	31.0	74.8	3.6	6.3	5.5	19.0	21.9	49.5
57-91.....	14.1	35.3	1.8	2.8	1.4	4.1	10.9	28.4
92-183.....	10.5	21.4	1.1	2.0	.7	1.7	8.7	17.7
184 or longer.....	6.9	7.9	.5	.4	.9	.8	5.5	6.7

¹ Industrial injuries and venereal diseases are not included.

² Digestive diseases, nonrespiratory-nondigestive diseases, and ill-defined and unknown causes are included.

NOTE: Average number of persons: males, 55,506; females, 13,480. These workers are members of 10 reporting organizations paying benefits for 26 or 52 weeks.

Table 3. Summary of disability data—sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer—years 1952 and 1951

Cause ¹	Males		Females	
	1952	1951	1952	1951
Number of days of disability per person				
Sickness and nonindustrial injuries.....	6.6	6.4	13.2	11.9
Nonindustrial injuries.....	.7	.6	1.0	.9
Respiratory diseases.....	1.1	1.3	3.0	2.9
Digestive diseases.....	1.3	1.2	1.5	1.4
Nonrespiratory-nondigestive diseases.....	3.5	3.3	7.7	6.7
Number of days of disability per absence				
Sickness and nonindustrial injuries.....	43.9	43.7	37.9	39.4
Nonindustrial injuries.....	44.3	41.9	41.6	45.6
Respiratory diseases.....	26.0	25.5	23.1	23.4
Digestive diseases.....	47.8	47.5	40.7	44.1
Nonrespiratory-nondigestive diseases.....	54.5	58.3	48.6	53.5
Number of absences per 1,000 persons				
Sickness and nonindustrial injuries.....	149.9	146.7	347.0	302.2
Nonindustrial injuries.....	15.3	14.8	23.6	19.0
Respiratory diseases.....	43.9	49.8	127.7	125.8
Digestive diseases.....	26.3	25.0	36.9	32.8
Nonrespiratory-nondigestive diseases.....	64.4	57.1	158.8	124.6
Average number of persons ²	55,506	55,853	13,480	12,831

¹ Industrial injuries and venereal diseases are not included. Ill-defined and unknown causes are included in the nonrespiratory-nondigestive diseases.

² These workers are members of 10 reporting organizations paying benefits for 26 or 52 weeks.

Table 4. Absences per 1,000 male employees by cause (annual basis)—sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer—third and fourth quarters, 1952 ¹

Cause ²	Number of absences per 1,000 males beginning in specified period			
	Fourth quarter		Third quarter	
	1952	1951	1952	1951
Sickness and nonindustrial injuries.....	123.1	125.0	103.8	109.3
Nonindustrial injuries (169-195).....	14.8	16.1	17.4	17.3
Sickness.....	108.3	108.9	86.4	92.0
Respiratory diseases.....	33.4	33.7	18.2	21.8
Tuberculosis of respiratory system (13).....	.6	.5	.5	.5
Influenza, grippe (33).....	8.0	8.7	3.8	5.1
Bronchitis, acute and chronic (106).....	6.1	6.6	2.6	3.7
Pneumonia, all forms (107-109).....	5.3	4.7	2.7	3.2
Diseases of pharynx and tonsils (115b, 115c).....	3.7	3.5	2.5	2.8
Other respiratory diseases (104, 105, 110-114).....	9.7	9.7	6.1	6.5
Digestive diseases.....	23.6	22.2	20.1	22.6
Diseases of stomach except cancer (117, 118).....	8.4	7.6	5.8	6.6
Diarrhea and enteritis (120).....	3.6	2.9	3.1	3.4
Appendicitis (121).....	4.1	3.9	3.5	4.8
Hernia (122a).....	2.8	3.7	3.3	3.1
Other digestive diseases (115a, 115d, 116, 122b-129).....	4.7	4.1	4.4	4.7
Nonrespiratory-nondigestive diseases.....	48.5	49.9	45.7	44.3
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) ³	3.8	3.2	3.3	2.9
Rheumatism, acute and chronic (58, 59).....	3.3	3.6	3.0	3.0
Neurasthenia and the like (part of 84d).....	1.2	1.6	1.3	1.9
Neuralgia, neuritis, sciatica (87b).....	2.3	2.3	1.7	1.8
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	2.4	1.9	2.2	2.2
Diseases of heart and arteries, nephritis and high blood pressure (90-99, 102, 130-132).....	9.1	8.7	6.7	6.2
Other diseases of genitourinary system (133-138).....	4.9	5.2	5.1	4.3
Diseases of skin (151-153).....	3.6	3.5	4.2	4.3
Diseases of organs of movement except diseases of joints (156b).....	3.7	3.9	3.3	3.3
All other diseases (45-57, 60-79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162).....	14.2	16.0	14.9	14.4
Ill-defined and unknown causes (200).....	2.8	3.1	2.4	3.3
Average number of males.....	174,594	173,679	174,353	174,068

¹ Industrial injuries and venereal diseases are not included. ² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939. ³ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.



Economic Benefits of Malaria Control

In the Republic of Indonesia

By WARREN A. KETTERER, M.D., M.P.H.

PUBLIC HEALTH PROGRAMS beget long-range economic benefits which may appear obvious to public health workers but which are often overlooked in considerations of the economy of a nation. In the newly established Republic of Indonesia, such benefits, though difficult to determine precisely since sickness of all kinds is omnipresent and statistics are generally lacking, are becoming evident. The malaria control program, in operation by the Indonesian Ministry of Health with assistance from the Technical Cooperation Administration Mission (formerly the Economic Cooperation Administration Special Technical and Economic Mission) to Indonesia has provided data which are sufficiently reliable and significant to give some indication of its benefits to the economy of the country. These data, though as yet meager, also serve to emphasize the importance of public health endeavors in the underdeveloped countries of the world.

Indonesia, as well as having a high prevalence of tuberculosis, typhoid fever, yaws, leprosy, trachoma—in fact, most of the diseases known to man—is one of the world's most malarious areas. It has been estimated that malaria affects approximately 30 million of its 77 million people each year, causing more deaths than any

other disease and greatly limiting the productive capacity of the nation. The number of attacks of malaria infection each year undoubtedly outnumber the population. A spleen index of 80 percent has been found in many areas, and malaria epidemics have been known to kill one-fifth of the population of an area in a single year.

ECA assistance for the Indonesian Ministry of Health's malaria control program began in October 1950. By June 30, 1952, DDT-house-spraying operations had protected 999,000 persons in Java, Sumatra, Celebes, and Amboina from this disease. The malaria section of the Ministry directed \$400,000 in 1952 toward house-spraying activities and aimed at a population goal of nearly 2 million for the end of 1952. The World Health Organization has provided \$74,000 since 1950 for a malaria control demonstration area on the south coast of Java, and requested assistance from the United States foreign aid programs has totaled \$1,449,000, \$929,000 of this amount for DDT and the remainder for technical assistance, educational activities, and sprayers and other commodities needed for the program. The population goal of the spraying program for the end of 1953 is 5 million.

Benefits to Agriculture

A concept of the broad economic importance of the malaria control program in Indonesia can be obtained from the realization that the activities are carried out in areas which are predominantly agricultural. Thus, malaria

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control contributes to the production of rice, which has been called the hinge of Indonesian economy, and of such products as rubber, copra, tobacco, tea, and palm oil, which are among the country's leading exports. With Indonesia importing 600,000 tons of rice yearly, an increase in rice production is perhaps of even greater economic importance in this country than it is in countries which export rice, since it should permit a reduction in expensive importation and in the use of foreign exchange.

DDT-spraying operations have made possible the reclaiming of idle rice fields in some areas and, together with improved agronomic practices, have led to an increase in yearly yield in others. Before World War II, rice fields frequently had to be drained and left to dry for several weeks to eradicate mosquito breeding and to reduce malaria. The DDT-spraying program makes this procedure unnecessary, permitting year-round cultivation.

Rice Production

Along the Bay of Banten in northwest Java, more than 10,000 acres of once highly productive rice land lay idle and deserted for several years after the Japanese occupation. The actions of the Japanese had destroyed the pre-war malaria control drainage system; and, as the drainage ditches silted up and salt water from the bay entered the rice fields, *Anopheles sundanicus* multiplied unchecked. The farmers remaining in the area, in their new concept of freedom, did not repair and maintain the permanent drainage system, but attempted to produce rice without regard for the threat of malaria. Malaria epidemics after 1944 affected more than 80 percent of the people, and the farmers were forced to abandon their land. The area soon reverted to tropical wilderness.

In September 1951, two DDT-house-spraying teams were sent into the area by the Indonesian Ministry of Health. As soon as the inhabitants nearby learned of the malaria control work, they began reclaiming the idle land. When the people came into the area, they found that malaria no longer decimated their population as it had done before the spraying.

By March 1952, 2,090 acres of this land were again under cultivation by old inhabitants, and 383 additional acres by new settlers (1). By

the fall of 1952, almost all of the area was under cultivation, and more farmers and their families were returning every day. When all 10,000 acres are again producing rice, it is expected that the yearly yield will be some 4,400 tons of husked rice to augment Indonesia's food supply. The total value of this rice should be approximately 8,380,000 rupiah (\$740,000); the total cost of the initial spraying operation was approximately 140,000 rupiah (\$12,000), less than 2 percent of the value of the yearly yield.

In addition to this program, the Ministry of Health plans to set up a yearly DDT barrier in this area between the coast and the inland. This should make possible the reclamation of another 18,000 acres of malaria-depopulated farmland because this DDT barrier will safeguard the inland area from mosquito-breeding places along the bay.

Export Products

A group of estates producing chiefly palm oil, but also other products, on the east coast of Sumatra were sprayed in 1950, protecting a population of 15,000. Evidence is available that malaria, which affected more than 80 percent of the population before the spraying activities, has been greatly reduced. Before spraying, examination of 402 babies revealed a parasite rate of 22 percent; the parasite rate in 298 infants born after the completion of spraying was 0 percent. The parasite rate in school children also declined, from 23 percent before spraying to 4 percent after.

Of great significance to the economy of the estates was the considerable decrease in admissions to the estate hospital after completion of the initial spraying. In the 11 months before spraying operations were begun, 2,363 patients were admitted, 700 of them with malaria. In the 11 months following spraying, 1,346 patients were admitted, 90 with malaria (1). The simultaneous decrease in illnesses aggravated by malaria, as reflected by the decrease in admissions excluding those for malaria, is characteristic. The decrease in hospital expenses alone was enough to finance the malaria control operations in this area. In addition, estate managers report a two-thirds decrease in absenteeism among the workers, resulting in an

increase in the number of working days and in production per man (1).

Transmigration Projects

Thirty years ago the Government of the Netherlands East Indies attempted a significant transmigration project in south Sumatra in an effort to relieve the population density in Java and to open new rice-producing areas. Malaria hindered the success of the project and curtailed the achievements planned for the area. Only with intensive use of expensive quinine could malaria mortality be maintained at a tolerable level. Late in 1951, DDT-spraying was commenced in the town of Metro, and by the end of 1952, 80,000 persons were protected from malaria. Continuation of the program will protect an additional 250,000 persons in this area (1). Already the transmigration area is becoming prosperous. Malaria rates are declining, additional land is being cleared, and new rice fields are opening up.

Another highly malarious transmigration area in North Celebes—around Dumoga—was sprayed in 1952. Before the war, transmigration attempts failed in six areas of Celebes because of malaria.

Other Benefits

Continued malaria control activities are also protecting the people in the major cities of Indonesia, among them Djakarta and Surabaya. In 1952, the hospitals of Djakarta reported a three-fifths reduction in admissions for malaria over the previous year.

In the coastal area around Djakarta, malaria control measures are benefiting the fishing industry. In the village of Marunda, 3 miles east of Tandjungpriok, *Plasmodium falciparum* infection has nearly disappeared. In 1949, the spleen index for children in this town was 91.5 percent and for adults 83.6 percent; malaria infection was totally absent in children born during the year after the spraying. In the village of Tjilintjing, 2 miles from Marunda, which was not sprayed, not only did the spleen index remain unchanged but a severe epidemic of malaria occurred (1).

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the south coast of Java, the habitations of its 9,680 persons were sprayed in mid-1952. Malaria was so serious on this island that the yearly cost of quinine for treatment was four times the cost of the malaria prevention operations.

In the area of Painan, Sumatra, which at one time had a spleen index of over 80 percent, 150,000 persons have been protected against malaria. Three months after spraying was begun in June 1952, the number of mosquitoes in the town itself had been so reduced that mosquito nets were no longer necessary.

In the fertile, but security-poor, area around Tjiandjur in central Java, the malaria control program has protected 190,000 persons. Ten months after spraying in an experimental area, the infant parasite rate was 0 percent; in a control (nonsprayed) area nearby, the rate was 18 percent (1). In their appeal for protection from malaria, local inhabitants guaranteed the safety of spraying crews in insecure areas.

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Summary

There is evidence that the malaria control program in Indonesia, which had protected nearly 1 million persons by the end of June 1952, is producing beneficial effects on several phases of the country's economy. Particularly important among these are the production of rice and such export products as rubber and palm oil, the establishment of transmigration projects, and the sea and inland fishing industry. In areas where DDT-house-spraying activities have been carried out, once-idle rice fields have been brought back under cultivation and new rice fields opened up; the number of hospital admissions for malaria, as well as the total number, have declined; and absenteeism among estate workers has decreased.

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Glaucoma Case Finding in Philadelphia

By EMILY K. HANKLA

AT LEAST ONE-EIGHTH of the blindness in the United States is caused by glaucoma, according to some estimates (1), and with the aging of the population it is probable that this condition will increase in importance. Although there is general agreement among ophthalmologists that the most important factor in the management of chronic simple glaucoma is its early detection, only one mass case-finding campaign has been reported in detail, that of the Philadelphia Committee for the Prevention of Blindness.

From 1944 through 1950, the period covered by this report, a total of 10,000 persons was screened, the majority during the fiscal year 1950, when the Public Health Service supported the committee's work. Earlier papers by the executive director of the committee and by ophthalmologists who took part in the case-finding procedure have described the background, methods used, and results of the Philadelphia program (2, 3). This paper presents a detailed description of the population screened, the initial tonometer readings, and the case-finding yield at various tonometer readings above the screening level.

Screening and Retesting Examinations

The screening examination, which was performed by certified ophthalmologists, included

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external examination for gross pathology, ophthalmoscopic examination of the fundus, visual acuity tests, and intraocular tension readings, using calibrated Schiøtz tonometers and a modification of the Schiøtz conversion chart (4). After these procedures ran smoothly, people were examined at the rate of 20 per hour. The screening tests were conducted in the plants where the screenees worked.

As has been found desirable in other mass case-finding programs, persons with positive screening results were retested before being referred to private physicians. Criteria for retesting were, in general, suspicious clinical findings or tonometer readings of 25 mm. Hg or more. The glaucoma screenee who returned for recheck might be classified as negative after a second or third tonometer reading; or before the examining physician decided upon a negative diagnosis or referral to a private physician, the screenee might have his fields of vision charted or a water provocative test or gonioscopic examination performed.

The retest clinic provided an additional service. Persons with borderline symptoms—persistent or intermittent tonometer readings of 28 to 30 mm. Hg and/or a rise of 6 to 8 mm. Hg on the Marx water-drinking test—were followed until a diagnosis of glaucoma could be established or ruled out. There were 71 such cases when they were classified in 1951 (3). In addition, there were 100 "observation" cases, persons with no indication of glaucoma except slightly to moderately elevated intraocular tension, a difference of 4 mm. or more in tension readings between eyes, or a family

increase in the number of working days and in production per man (1).

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according to a calibration chart, the positions of a wavering pointer on a small scale.

To illustrate, more than one-fifth (22 percent) of the group tested had initial tensions of 22 mm. Hg, the modal, median, and mean reading for the eye with the highest tension. On both sides of this peak, there were fewer readings than would be expected in a normal distribution. For only 322 persons was the initial high tension given as 21 mm. Hg. On the right-hand side of the mode, the slope is more regular but there are only 3 millimeters between the modal value and 25 mm. Hg, which was adopted as the screening level. The wide and one-sided range at the base, from 11 to 65 mm. Hg, with a few high values representing the more abnormal or unusual occurrences, is also characteristic of measurements of blood pressure, blood sugar, or hemoglobin.

Of the 9,645 persons with tonometer readings for both eyes, 1,056 (11 percent) had intraocular tensions in one or both eyes equivalent to 25 mm. Hg or more, the screening level which had been adopted. Of these, 815 were called back for reexamination or put under medical care. Glaucoma or "borderline" intraocular tension was diagnosed in 21.2 percent of the 1,056 suspects with initial tensions of 25 mm. Hg or more, or 2.2 percent of the total number screened. Virtually none of the glaucoma patients had any previous knowledge of their disease.

In figure 2, tension readings above the screening level of 25 mm. Hg have been grouped in 3 mm. intervals. Even in the first interval, among those with initial readings of 25 through 27 who were retested, 10 percent (32 cases) were classified as having glaucoma or "borderline" tensions. With higher initial readings, the percentage of positive classifications increased. Original tonometer readings of 40 mm. Hg Schiøtz or higher were followed in all instances by diagnoses of glaucoma.

It should be noted, though, that the cases picked up at the 40 mm. Hg Schiøtz screening level numbered only 20, compared with 32 instances of glaucoma or "borderline" intraocular tension with initial readings of 25 to 27 mm. Hg and 90 at the 28 to 30 mm. Hg level. Moreover, all but one case with initial tensions of 40 mm. Hg or more were later classified as advanced

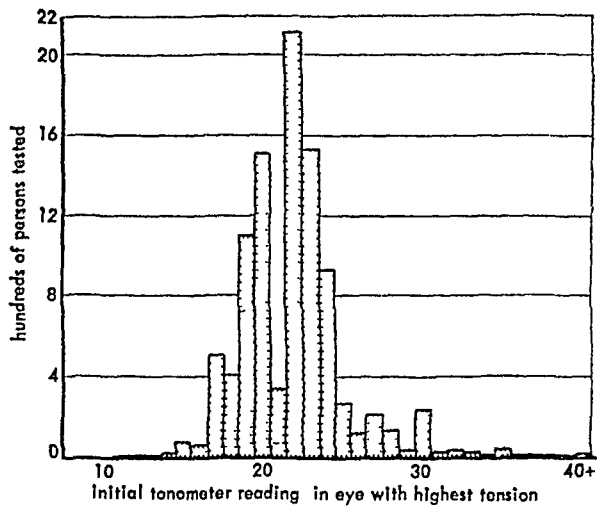


Figure 1. Number of persons tested, by initial tonometer reading (in mm. Hg Schiøtz).

glaucoma, while 95 cases (78 percent) with original tensions of 25 to 30 mm. Hg were either early glaucoma or "borderline" intraocular tension. (See figure 3.)

Age and Intraocular Tension

With age there is an increase in the percentage diagnosed as having glaucoma or "borderline" intraocular tension, as may readily be seen in table 2.

If all cases are grouped together, and distributed by their age, their ratio to the total num-

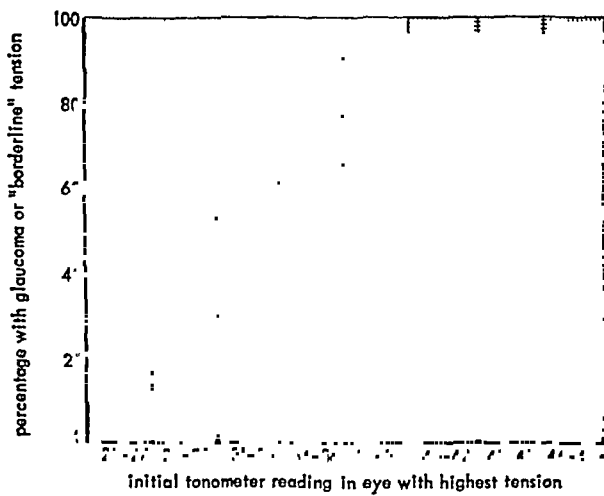


Figure 2. Percentage of persons with confirmed glaucoma or "borderline" intraocular tension who had initial tonometer readings (in mm. Hg (Schiøtz) of 25 or more.

examination, and diagnosis. For those with "borderline" tonometer readings and negative diagnoses, the tests should be repeated at intervals. Investigation is needed before we can estimate how elevated tension must be to be regarded as dangerous. Such a study would furnish a basis for estimating the number of those who might be inaccurately classified as negative in a mass screening survey. These data would enable us to compare "borderline" screening levels for sensitivity as well as specificity.

Further investigation of screening methods is fundamental to a public health approach to this problem. Although without some count of the "false negatives," we cannot accurately estimate the size and cost of the problem of undiscovered glaucoma, we know that it is large and expensive. The cost of services to the blind paid from taxes or privately donated funds has been estimated to be in excess of \$125,000,000 per year (1, 9). This sum does not include expenditures by relatives or by blind persons themselves. Nor does it include the costs of unemployment caused by blindness or any of the economic costs of partial vision.

Summary

Among 10,000 working people screened for chronic simple glaucoma by the Philadelphia Committee for the Prevention of Blindness, no differences in frequency were found by race and sex, within age groups. More cases of chronic simple glaucoma are found in the older age

groups; these cases are likely to be advanced.

The higher the intraocular tension, as indicated by a Schiøtz tonometer reading, the more specific is the indication of glaucoma, especially of advanced glaucoma. On the other hand, the "borderline" tension levels are most productive of "borderline" cases.

The need for more study, with emphasis on long-term followup of "borderline" cases, is evident from the data.

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Departmental Council Formed To Aid Secretary

To achieve maximum coordination in the administration of the Department of Health, Education, and Welfare, the Secretary has created a Departmental Council composed of top officials and heads of constituent units of the Department. Henry G. Haskell, Jr., of Wilmington, Del., has been named as secretary of the Council.

Disinfecting Garbage in Truck Bodies

By Direct Steam Injection

By HERBERT A. BEVIS, B.C.E., M.S.E., FRANK TETZLAFF, C.E., M.C.E.,
and FLOYD B. TAYLOR, B.S.S.E., M.P.H.

FEEDING of raw garbage has been shown to be the primary mode of transmission of trichinosis in swine (1) and thus is indirectly the source of human infection. It is felt that this practice contributes greatly toward the dissemination and perpetuation of other swine diseases.

The escape of vesicular exanthema, a highly contagious swine disease, from its two-decade isolation in the swine herds of California and its subsequent wildfire spread through the herds of the Nation have further motivated a critical review of the practice of feeding garbage to swine. The exact path the disease followed from the time it escaped from California until it was detected among swine at a hog cholera serum plant in Nebraska was investigated by the United States Department of Agriculture and various State agencies concerned. Indications were that garbage containing infected pork scraps had been fed raw to swine at a farm in Wyoming and that infected animals had been shipped to other areas of the country be-

fore the disease was recognized. As of May 1953, 468 of 493 herds in which the disease had appeared had been fed raw garbage, and outbreaks had occurred in 41 States (2).

The work of Wright and Bozicevich (3) showed that the worm *Trichinella spiralis*, the infectious agent in trichinosis, could be destroyed or made nonviable by subjecting pork scraps containing the organism to adequate heat. The degree of heat that constitutes adequate treatment will depend upon the thickness of the pork scraps and the duration of heat. Experiments have shown that the actual temperature required throughout the mass to destroy *Trichinella spiralis* is 131° F. (4) and a temperature of 145° F. maintained for 30 minutes is thought to render the virus of vesicular exanthema nonviable (5). However, the work of Wright and Bozicevich (3) led to the conclusion that for practical purposes disinfection of the garbage by boiling for 30 minutes was desirable and that this degree of heat treatment is sufficient to "effect the destruction of trichina larvae in pieces of pork up to 3 inches in thickness and probably in pieces of pork of greater thickness provided the garbage is allowed to cook gradually." This statement is the basis for general recommendation that all garbage be boiled for at least 30 minutes prior to feeding to swine unless some other manner of disinfection is approved by health or agricultural authorities concerned as being equally effective.

Mr. Bevis is sanitary engineering consultant to the National Park Service for Public Health Service, Region III; Mr. Tetzlaff is regional engineer in the Region II office; and Mr. Taylor, a sanitary engineer formerly with Region II, is now assigned to the Clinical Center, National Institutes of Health.

The application of this heat treatment principle on a nationwide basis in England and Canada tends to substantiate the experimental work. In these two countries, where garbage is cooked prior to swine feeding, most swine diseases have practically disappeared and the incidence of trichinosis in humans is estimated to be only about 1 case in 75 persons (6). In the United States, where raw garbage is used as swine feed, the incidence of trichinosis in humans is estimated to be 1 case in 6 persons (7). More accurate figures on the prevalence of this disease are not available due to its many manifestations and the absence of a specific diagnostic confirmation other than recovery of the organism by biopsy.

If garbage, a valuable waste product of the American home, is to continue to be reclaimed in the form of pork, some economical method of disinfecting it must be found.

At the present time the general feeling among the swine farmers of the country is that an installation which could provide the necessary heat treatment of garbage in the truck in which it was collected would be most practical. This procedure would eliminate the necessity of rehandling the waste and would thus be a saving in time and labor. In order to ascertain if such treatment in truck bodies could produce satisfactory temperatures, the Region II office of the Public Health Service conducted an experiment at the North Bergen Stock Farm, North Bergen, N. J., during February, March, and April 1953 on the heat treatment of garbage in truck bodies, using direct steam injection as the source of heat and agitation.

Equipment

The truck used in this experiment was equipped with a rectangular metal tank body 15 feet long, 8 feet wide, and 34 inches deep. The tank was covered with semicylindrical sliding doors and had two arched wheel wells over the rear wheels of the truck.

A 2-inch steam supply line entered the tank high on the left side of the front, ran across to the middle of the front, and down to the bottom, where it was connected to a 1½-inch header. From the header, 1-inch laterals, numbering from four to seven during the course of

the experiment, were run the length of the tank to distribute the heat. One-eighth inch holes were drilled on a horizontal plane through both walls of each lateral, on 12-inch centers in the forward half of the tank and on 6-inch centers in the rear half. Where necessary, the laterals were curved over the two arched wheel wells and welded in place.

A 2-inch flexible rubber hose fastened to a universal coupling by a heavy-duty hose connection was used to connect the steam manifold system in the truck to a 150-hp, oil-fired, horizontal boiler. This boiler was capable of providing steam at a pressure of 125 psi, but in this series of tests the automatic control was set to maintain a pressure between 45 and 55 psi. As these tests were being run the boiler was concurrently providing heat for the animal barns.

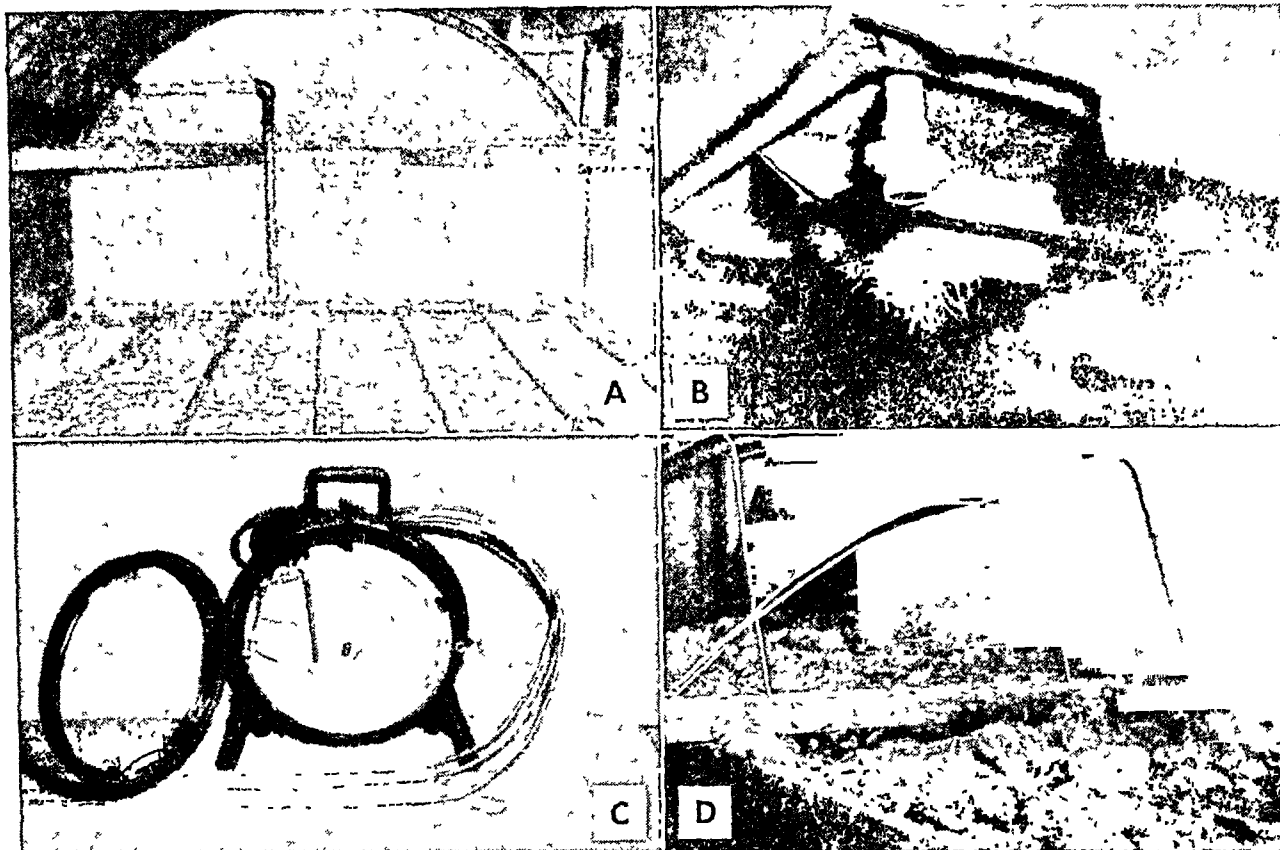
A specially designed, portable, three-pen recording thermometer was used to record temperatures at various points in the garbage mass during each cooking cycle. This instrument had a class IV thermal system (liquid expansion), 0°–300° F. temperature range, a mechanically driven clock on a 24-hour cycle, and three 14-foot acid-resistant leads (10 feet flexible and 4 feet rigid stainless steel).

A wooden beam was used to support the thermometer leads in the garbage mass during each test, with the thermometer bulb located at the end of each lead. The locations of the leads were varied during the tests, as shown in the table.

Procedure

Prior to each test in this experiment, the garbage, which had been collected from the hotels and restaurants of New York City during the preceding night, was leveled in the tank with a garden rake. Often this garbage was of such a solid nature that a man experienced no difficulty in walking on top of it as it was prepared for treatment. Three to six inches of clearance was normally allowed between the surface of the waste and the rim of the tank to accommodate the accumulation of steam condensate. Under these conditions the tank held about 300 cubic feet (2,244 gal.) of waste, which weighed from 8 to 10 tons.

After the garbage had been leveled, the ther-



(A) Interior of truck, showing seven distribution laterals. (B) Ground key blowoff valves for laterals, located under rear of truck. (C) Portable recording thermometer with 3 bulbs and 3 indicating pens. (D) Thermometer bulbs placed in garbage and held secure by wooden support.

monometer support was placed across the tank above the section of the truck body to be investigated during the test. The three thermometer bulbs were inserted into the garbage through holes in the timber to the desired depth and were locked in place with set screws. By varying the location of the thermometer bulbs longitudinally, laterally, and vertically, temperatures in all sections of the tank were investigated during the course of the experiment.

The steam was turned on after the initial temperature of the garbage mass had been determined. Erratic heat distribution in the first tests quickly established the need for a means of eliminating condensate and garbage liquor, which tended to clog the lines, and blowoff valves were installed. During the tests made after the valves were installed, the laterals were drained as soon as pressure was applied to the system, and any condensate or garbage liquor in the lines was removed. This draining opera-

tion was repeated several times during each test.

When the desired temperature had been reached and maintained for the required length of time the steam was turned off and the garbage was allowed to cool. The thermometer bulbs remained in the mass during the first part of this cooling period in order to ascertain the cooling characteristics of each section of the tank. The center portions of the garbage cooled very slowly and it was normally the following day before it was unloaded and fed to swine.

Since the tests were conducted out of doors the atmospheric temperature was noted during each run.

Results

In the first series of tests in this experiment a steam distribution system was used. The system contained 4 laterals connected to the main

header across the front of the tank, and spaced on 30-inch centers. The 2 outside laterals were elbowed and extended about 3 feet across the rear of the tank. When steam was introduced into the garbage mass through this system, a liquid channel soon formed directly above each lateral and most of the steam took this path of least resistance to escape. This flow of steam caused a mound of waste to be thrown up between the laterals which heat did not penetrate. Upon one occasion, after 4 hours of heating, including 3 hours of boiling in the watery channels, a temperature of 98° F. was found in 1 of these mounds.

In an effort to overcome this channeling tendency, 2 additional laterals were added, making a total of 6 laterals on 16-inch centers.

The elbowed extensions of the two outside laterals across the rear of the tank had been found to be ineffective, and were omitted. This new design reduced the channeling tendency, but a critical condition was located directly behind the wheel wells on each side of the tank. Either condensate or garbage liquor appeared to be filling the pipe lines at a point immediately after they curved over the wheel wells, and very little steam reached the garbage in these two areas. The design did produce acceptable results on occasions but generally the results were erratic and uncertain.

To eliminate channeling completely, the number of laterals was increased to 7, on 14-inch centers, and to remove condensate and garbage liquor from the lines, each lateral was

Temperature-time results with improved steam distribution design

Run No.	Date of test and air temperature during test	Heat-ing time (min-utes)	Pen No. ¹	Location ²			Temperature variation and time each temperature maintained (min.)		
				x	y	z	Above 170° F.	Above 190° F.	Above 210° F.
6	Mar. 12 41°-43°	105	1	Bottom-----	<i>Fect</i> 3.5	<i>Fcet</i> 12	230	140	65
			2	Bottom-----	2.5	12	130	60	(206° F. max.)
			3	Bottom-----	.5	12	115	85	25
7	Mar. 18 41°-40°	80	1	Bottom-----	3.5	13	130	95	70
			2	Mid-pt-----	2.5	13	360+	360+	75
			3	Mid-pt-----	.5	13	195	200	65
8	Mar. 20 42°-43°	105	1	Near surf-----	3.5	13	130+	70	(199° F. max.)
			2	Near surf-----	2.5	13	160+	125	95
			3	Bottom-----	.5	13	105+	85	45
9	Mar. 25 49°-50°	98	1	Mid-pt-----	4.5	8	95+	90+	60
			2	Near surf-----	2.5	8	45+	30+	5
			3	Bottom-----	.5	8	95	50	(195° F. max.)
10	Mar. 27 40°-41°	110	1	Mid-pt-----	4.5	3	165	10	(191° F. max.)
			2	Mid-pt-----	2.5	3	345+	345	(209° F. max.)
			3	Bottom-----	.5	3.4	220	145	90
11	Mar. 30 43°-44°	65	1	Near surf-----	3.4	3.4	210	85	10
			2	Bottom-----	1.8	1.8	110	70	40
			3	Mid-pt-----	.5	.5	55	15	(198° F. max.)
12	Apr. 1 48°-49°	135	1	Near surf-----	4.2	2.2	310+	35	(200° F. max.)
			2	Mid-pt-----	6.0	3.2	310+	300	270+
			3	Mid-pt-----	7.7	4.2	280+	20	(193° F. max.)
13	Apr. 3 46°-49°	90	1	On surf-----	4.5	10.6	80	30	5
			2	Bottom-----	6.2	11.6	75	(180° F. max.)	(180° F. max.)
			3	Mid-pt-----	7.9	12.6	240+	240+	60

¹ No. 1 pen, red; No. 2 pen, violet; No. 3 pen, green.

² Location of thermometer bulb is indicated by x, y, and z axes. The bottom left front corner of the truck body serves as the origin, x being the vertical axis, y the transverse axis across the truck from left to right, and z the longitudinal axis from front of truck to rear.

elbowed down through the rear of the tank bottom and terminated with a 1-inch ground key blow-off valve. A watertight, bolted, and removable tail gate necessitated placing the valves under the tank rather than on the rear wall. This improved design gave a uniform distribution of steam and normally produced acceptable heat treatment. A tabulation of the results of eight runs using this improved design is given in the table.

Several times during the course of the experiment "dead spots" were located in the garbage mass which heat did not penetrate. These spots were usually in a tightly packed wad of material held together by napkins or papers.

After a uniform distribution of steam was obtained, heat was found to rise to the surface of the mass in a distinct horizontal blanket except around the perimeter of the tank, where steam followed the metal sides to the surface very quickly.

Conclusions and Comments

1. Garbage can be disinfected in a metal tank truck body using steam injected directly into the mass through laterals placed on 14-inch centers and terminated with blowoff valves. (There were seven laterals in the truck body used in the experiment.) Due to the many possible sources of error in this type of system, however, steam injection in truck bodies is not the ultimate solution to the problem, either from the viewpoint of the operator or of the regulatory agency, and this system of treating garbage with heat should be used only as an interim measure until a properly designed built-in-place installation is available.

As a result of an analysis of general steampipe layout design procedures, made after completion of the heat treatment experiment, the following theoretical conclusions seemed indicated:

(a) The cross-sectional areas of the header pipe should be approximately equal to or slightly larger than the cross-sectional area of the supply line.

(b) The total cross-sectional area of the laterals should be approximately equal to the cross-sectional area of the header pipe.

(c) The aggregate area of the drilled holes should be approximately one-half that of the steam supply line. In general, the smaller the aggregate area of the holes, the more uniform the steam flow will be out of each hole, and smaller holes will allow the use of a greater number of holes, thus insuring more even heat distribution through the garbage.

These theoretical conclusions may be checked in future experiments.

2. Separation of edible and nonedible waste material is very desirable. However, if any glass bottles should accidentally be included in the garbage they will not be broken by this type of heat treatment.

3. Breaking up any semisolid masses of material as the garbage is placed in the tank will help reduce the possibility of "dead spots" and inadequate heat penetration.

4. Manual agitation of the garbage with a wooden paddle will help insure proper distribution of heat.

5. Three to six inches should be allowed between the surface of the garbage and the top of the tank to prevent spillage when steam condensate accumulates.

6. The surface of the garbage should be covered to conserve heat and prevent spattering. If possible, the treatment should be provided in an insulated building, especially during the winter.

7. Laterals should be blown off as soon as steam pressure is applied and at half-hour intervals thereafter.

8. The equipment should be cleaned after each use. Special care should be given to the interior of steam lines and orifices because cooked garbage is sucked into the lines by the vacuum formed when the steam pressure is turned off. This cooked garbage will solidify as it cools and may block the line.

9. Uniform spacing of orifices on 6-inch centers over the entire length of the laterals would probably produce results as good as, if not better than, the results obtained with this equipment.

10. When the cooked garbage is allowed to cool in the tank it usually requires up to 24 hours for it to cool sufficiently to be fed to swine. This means the truck in which garbage is treated would be out of service every other

such categorization of health activities has some utility in relation to research, dissemination of knowledge concerning particular health hazards and the methods for dealing with them, and the securing of support for public action.

Official health agencies, however, are seldom organized solely along special purpose lines. Executive, supportive, and even substantive program services which contribute to the execution of a particular health program are often provided by organizational units not a part of the specific program staff. Furthermore, local health services are usually carried out by a general staff which has responsibility for conducting a public health operation encompassing all categories of programs.

Accounting in this situation would be greatly simplified under either 1 of 2 conditions: the financing of all programs from one fund, or the administration of each program by a single organizational unit supported from one fund. Neither solution is entirely practicable. Legislative program authorization by major purpose and implementing appropriations usually make financing from one fund impossible. The excessive costs of duplicating specialized personnel (by discipline or by process) make separate administration of each program impractical.

The State health department accountant is therefore faced with a task of setting up an accounting system which produces expenditure data by funds (purpose), responsible organization, activity, and object. To do this requires a great number of detailed accounts. The number of original entry accounts for a typical program is illustrated in the chart by the number of lines leading to the symbols at the bottom representing the various funds. The increase in object accounts, because of the addition of one more fund, or organization, or activity is obvious.

Proper accounting for funds spent on a public health program becomes more difficult when costs of program coordination, administrative staff services, or special professional services must be identified. What the accountant needs is a device which may be adjusted to the necessities of program administration. Fund accounting is too inflexible and cumbersome in complex program situations to justify the

bookkeeping cost involved. Under the fund accounting procedures which were first used in many States it was not unusual to find a local health officer or public health nurse receiving 4 or 5 separate salary checks each pay period. Their services contributed to many programs, and from each they received separate recompense. This situation was improved somewhat by a more judicious budgetary allocation of funds. But there is an accounting concept that can be used to further simplify the handling of special purpose funds in administrative situations in which both general and special purpose activities are involved. This is the concept of the revolving fund.

Application of revolving fund techniques to accounting for special purpose health grants depends upon the ability of the grantee to make disbursements for salaries, supplies, contractual services, rentals, equipment, and other items, from a single account. Federal requirements which originally prevented any application of revolving fund techniques to grant fund accounting have been eliminated through a series of amendments to the grant-in-aid regulations. First, a requirement that State accounting and disbursing officials maintain separate and distinct fund accounts was amended in 1943 to permit State treasurers to consolidate grant funds with other moneys in accounting for the custody of cash received by the States. Then, in 1949 the commingling of grant funds to the extent of consolidating all health grants in one account on the books of the principal State accounting officer was permitted. At the discretion of the State, the State health executive may now be the only State official responsible for keeping a separate account for the receipt and disbursement of each health grant.

With Federal requirements no longer a barrier to the use of simpler fund accounting techniques, in 1951 the grant operations branch of the Division of State Grants of the Public Health Service approached a few fiscal officers of State health departments to discover if they found the idea of a single grant operating account feasible and worth special study. Individual fiscal officers and members of the Subcommittee on Fiscal Affairs of the Federal Relations Committee of the Conference of State and Territorial Health Officers ap-

Nature and Purpose of Local Health Unit Record and Report Systems

Largely by means of excerpts, the author of the concurrently issued Public Health Monograph presents here the main points of her thesis that records and reports are basic elements in any health department operation, that they require the thoughtful consideration and imaginative evaluation not only of those who maintain them but also of those who create and utilize them. On page 1081 the content of the monograph is outlined.

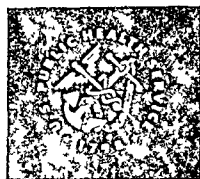
Records and reports represent an important aspect of public health administration. A more active exchange of experience and observations by means of technical papers and critical evaluations would tend to improve and strengthen current practice. The editors of Public Health Reports are prepared to facilitate such an exchange and will welcome receipt of appropriate manuscripts.

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Records aid in promoting continuity of service and provide source material for periodic and special analytical reports. Thus, records and statistical reports may be looked upon as distinct entities: Records are written statements noting facts and events pertaining to an individual or establishment. Reports are accounts, statistical summaries, or statements of relationships of pertinent material obtained from records.

Medical and nursing records in local health departments contain entries of the findings, observations, services given, and recommendations regarding individuals and members of their families; sanitation records contain entries of the findings, recommendations, and action of the health department regarding premises and establishments. These records are used by:

Medical staff to refer to the past history of the individual, to provide a source of data for special epidemiological and other research



Public Health

MONOGRAPH

No. 15

The accompanying summary covers the principal findings presented in Public Health Monograph No. 15, published concurrently with this issue of Public Health Reports. The author now is chief medical record librarian in the Clinical Center, National Institutes of Health. Between 1946 and 1951, she conducted surveys and demonstration projects for the Division of Public Health Methods and the Division of State Grants of the Public Health Service in the organization of record and report systems in local health departments. This monograph, which includes an index and 38 figures illustrating forms, equipment, and systems used by these health departments, presents her findings and recommendations.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

Johnson, Olive G.: Records and reports of local health departments. Public Health Monograph No. 15 (Public Health Service Publication No. 285). 92 pages. Illustrations. U. S. Government Printing Office, Washington, 1953. Price 45 cents.

studies, and to furnish materials for resident training and staff education.

Nursing staff to provide a tool for adequate nursing service to the individual and his family and for correlation of nursing services with the services given by other members of the health department staff, to furnish a means of integrating health department services with those of other agencies in the community, and to provide material which will aid in the inservice training and supervision of the staff.

Sanitation staff to provide source material for analyzing program operations, special problems, and personnel activities, and to furnish data for staff education.

Administrative staff to provide a source of information that is necessary for administrative coordination and control of each program, for evaluation of services furnished, for evidence in legal action, and for information to be used in answering authorized requests from other agencies.

Reports measure the services given by the local health department. They are needed to evaluate the general and specific programs of each division of the department in relation to the needs of the community, to determine the problems arising in each program, to direct the programs toward future needs, to analyze services in relation to administrative procedures and costs, to evaluate the achievements of department personnel and the efficiency of each division, to compare activities of the department with the work of similar agencies, and to provide material for public information and health education. Individual and family records form the basis for reports.

Basic Problems

Self-appraisal of record and report systems in local health departments has revealed that existing records and reports frequently are not meeting the health department needs. Staff members are becoming increasingly aware that records and reports serve their purpose only when they meet the specific needs of the administrative, medical, nursing, and sanitation staffs.

The objectives of the organization determine the content and function of records and re-

ports. Content and function, in turn, determine the source of material, the method of recording, the data to be recorded, the number of personnel to be employed, and the systems, methods, and procedures to be developed. To adopt a form or a procedure without considering the preliminary steps breeds confusion and waste. It is just as inconsistent to continue the same procedures year after year without reviewing the objectives.

However, many local health departments have maintained the record and report procedures started many years ago to assist in serving and appraising the programs then in existence. Since communicable disease was the focus of attention, service was directed to the case. Each case was considered an entity, and for some individuals several records were on file. This type of record system is a handicap to the health workers of today because current programs are directing attention to the individual and his family. A longer time period is involved; socioeconomic factors must be considered. The value of a continuous record of services given to each individual is recognized. Reference to these records reveals information on the individual's health history, social and economic problems, previous illnesses, results of diagnostic tests and therapy, and staff recommendations. When the records are not combined, it is difficult for the attending physician and nurse to refer to all records of an individual. There is frequently no way of knowing that the person has been seen or is at present being seen by another staff member. Duplications of service and of diagnostic tests may result; contrary recommendations may be made.

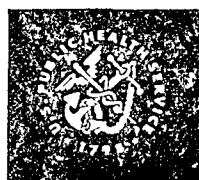
Similarly, the statistical reports that are prepared in many health departments were created and have been developed primarily to obtain a count of services given. The type of report which results does not present the data that are essential today. There is a continuing need to study the objectives of each program to determine the data necessary for evaluating service given and determining service and personnel required.

No health department can satisfactorily adopt the record and report forms or systems of another health organization without analysis of the suitability or usefulness of the data re-

Nature and Purpose of Local Health Unit Record and Report Systems

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Records and reports represent an important aspect of public health administration. A more active exchange of experience and observations by means of technical papers and critical evaluations would tend to improve and strengthen current practice. The editors of Public Health Reports facilitate such an exchange of appropriate



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Outline of Content of Public Health Monograph No. 15

Many local health departments have recently studied their record and report systems and have found it necessary and desirable to develop simpler, more effective, and more adaptable procedures. Findings and recommendations presented in Public Health Monograph No. 15, "Records and Reports of Local Health Departments—Criteria and Methods for Organization, Maintenance, and Use," are based on surveys of systems used in 25 local health departments in 8 States and on demonstration projects in a city and a city-county health organization, which were conducted at the request of the State and local health departments concerned. The studies and demonstrations were sponsored by the Division of Public Health Methods and the Division of State Grants of the Public Health Service.

The monograph illustrates a method in which the staff of various divisions of a health department, working in collaboration, critically examine each record and report maintained by the department. This self-appraisal is considered as an essential step in improving the usefulness of each record and in developing a system of records and reports that will meet the needs of all units of the health department. Principles of organization and detailed explanations of the mechanics of recordkeeping are given. The principles and methods described are not dependent on the size of organizations involved; they are applicable equally to small and large health departments.

Application of principles as carried out in a demonstration project—a city health department serving a population of over 500,000—is described

in some detail, beginning with the initiation of the project. Considerations involved in installing the record and report systems are reviewed, with discussion of problems associated with selecting and tabulating minimum data and with establishing an office of records and reports. The record and report procedures followed by each person concerned are outlined.

Supplementing this demonstration area material are six "case studies" illustrative of the greater accessibility, uniformity, and usefulness of local health department records which can be achieved through reorganization. Diagrammatic representations of the systems support the examples, which are:

Case I. Medical and nursing records in a health center in a city-county health department.

Case II. Medical and nursing records in a three-county unit health department.

Case III. Medical and nursing records in a health center in a city-county health department.

Case IV. Sanitation records in a city-county health department.

Case V. Establishing a central index in a city-county health department.

Case VI. Facilitating interchange of information among a health organization's units.

Included in the appendix to the monograph is a statement of basic principles governing service statistics in public health, as prepared by a working group of the Public Health Conference on Records and Statistics in 1951.

training clerical personnel. Central control of clerical services should facilitate the installation of standard procedures and aid in the elimination of duplication. It should also permit greater utilization of clerks by making possible the transfer of employees from one office to another, for example, during the time of the day when there is a peak load in one office and a slack period in another or when an employee is absent from duty.

Meeting Community Needs Economically

Recognition of the adequacy or inadequacy of existing systems is an essential step in determining the need for records and reports. This often leads to clarification of problems existing in the administration of health services and frequently results in coordination, increased efficiency, and economy of services.

Health department services—and, reflecting

these services, their record and report systems—vary with community population and habits, climate and topography, natural resources, and the available personnel, facilities, and functions of other health agencies in the community. The variance among programs in scope and development emphasizes the value of analyzing activities and achievements against

the background of community requirements. Analytical reports, in addition, can serve as tools for the evaluation of performance of staff members, can aid in the study of administrative procedures, and can furnish data essential for informing the community of its resources for health service and unmet needs.

—By OLIVE G. JOHNSON

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The Growth of Local Health Units in Florida

By WILSON T. SOWDER, M.D., M.P.H.

TO A CONSIDERABLE DEGREE, any separation of local health services from services provided by other government echelons is artificial and somewhat illusory. Perhaps some persons interested in the subject would define local health services as those that are completely financed and administered by local governments. If such a definition is accepted and interpreted strictly, Florida would have few local health services to report. In fact, there are few public health services in the State which are not supported to some extent, directly or indirectly, by State or Federal funds and which are free entirely from some legal control, under State or Federal laws. In this paper, therefore, will be described the development of those public health services which are financed and administered, in whole or in part, by local governmental agencies; and it will be left to the reader to accept or reject this definition.

Facts about local health services during the several centuries of the Spanish regime and during the brief British occupation are fragmentary or lacking. However, in 1821, Gen-

eral Andrew Jackson, in his capacity as Governor of the Territory, issued a proclamation setting up a board of health in Pensacola and appointing a health officer.

The present State constitution, which was adopted in 1885, not only provides for a State board of health, to have supervision over all public health matters in the State, but also provides that county boards of health "may be established." The State board of health was established by legislative action in 1889, after a severe yellow fever epidemic, and county boards of health were provided for by statute and appointed within the next several years.

However, even before the turn of the century, the State health officer had recommended the abolition of the county boards of health and the legislature had complied. This course was taken because each county board of health had not only adopted its own regulations for the control of communicable diseases, especially yellow fever, but these regulations were enforced with varying degrees of zeal, usually too much. Most funds and energy were spent on quarantine procedures, with special emphasis on the exclusion of travelers and goods from areas suspected of infection, and written permission was necessary from each county involved before travel could be undertaken. Such actions resulted in "Iron Curtains" between the counties of the State, since communicable diseases were frequently present and oftener rumored. The abolition of county boards of health was therefore probably quite justified and necessary in order to end this state of chaos, and to bring about uniformity in

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Table 1. Growth of county health units in Florida from 1930 to 1953, at 5-year intervals

Year	Number of organized counties ¹	Population served ²		Total expenditures ³	Number of persons employed ⁴
		Number	Percent		
1930-----	1	13, 136	1	\$9, 000	4
1935-----	3	76, 129	5	41, 903	29
1940-----	25	618, 541	33	329, 654	147
1945-----	36	1, 510, 520	67	1, 243, 104	482
1950-----	64	2, 511, 898	91	2, 733, 325	755
1953-----	66	2, 879, 880	93	3, 674, 320	796

¹ Status as of December 31.

² Population figures from Federal censuses of 1930, 1940, and 1950; State censuses of 1935 and 1945; and estimated data for 1953. Population of cities with independent health departments excluded, except where services limited and majority of services provided by county health department.

³ Expenditures are for the fiscal year beginning July 1.

⁴ Estimated.

health laws, regulations, and practices throughout Florida. Following this action, for the next 30 years and more, except in the larger cities and towns, public health services were provided by persons employed directly by the State board of health.

County Health Departments

The present era of local health administration began in 1930 with the passage of a State law authorizing joint financing between counties and administration of county health units by boards of county commissioners and the State board of health, and cooperation with

cities. Funds were to be deposited in the State treasury to the credit of the county involved. Minimum personnel required included a physician, a public health nurse, a sanitary officer, and a clerk, who were required to devote their entire time to public health work. Personnel were to be appointed by boards of county commissioners with the approval of the State health officer and their salaries were to be fixed by the State health officer with the approval of the board of county commissioners. Multicounty units were authorized with common budgets and personnel.

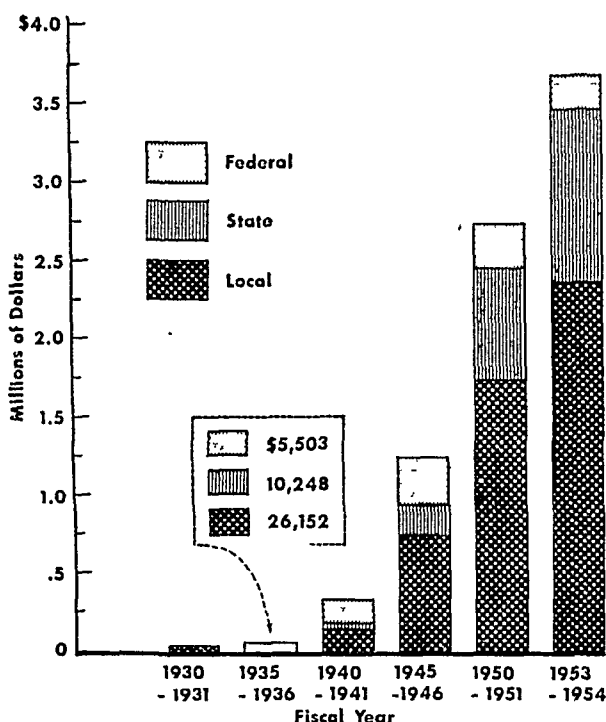
This excellent law has been so entirely satisfactory that no attempt has ever been made to

Table 2. Total and per capita expenditures of Florida county health units, by source of funds, at 5-year intervals, 1930-53

Source of funds	Fiscal year					
	1930-31	1935-36	1940-41	1945-46	1950-51	1953-54 ¹
Total expenditures						
Total-----	\$9, 000	\$41, 903	\$329, 654	\$1, 243, 104	\$2, 733, 325	\$3, 674, 320
Federal-----	9, 000	5, 503	148, 911	297, 879	272, 832	208, 680
State-----		10, 248	47, 836	201, 246	727, 075	1, 090, 220
Local-----		26, 152	132, 907	743, 979	1, 733, 418	2, 375, 420
Per capita expenditures						
Total-----	\$0. 69	\$0. 55	\$0. 53	\$0. 82	\$1. 09	\$1. 28
Federal-----	. 69	. 07	. 24	. 20	. 11	. 07
State-----		. 13	. 08	. 13	. 29	. 38
Local-----		. 34	. 21	. 49	. 69	. 82

¹ Estimated.

Figure 1. Total expenditures and source of funds of Florida county health units. (All 1930-31 funds were from Federal sources.)



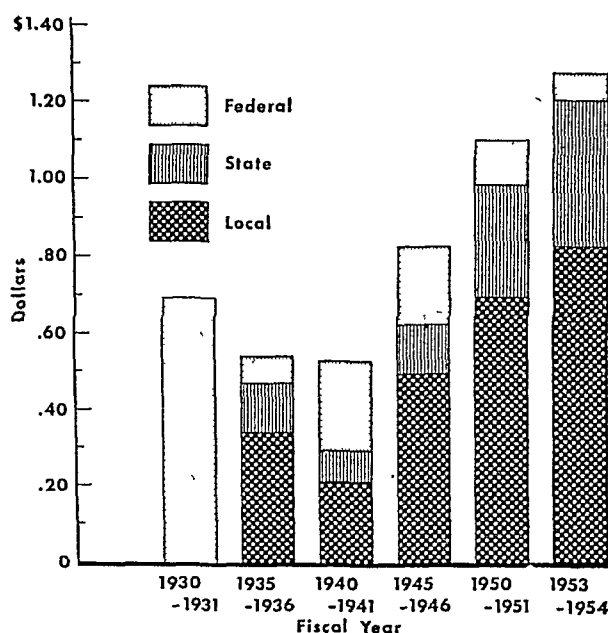
change it. Soon after its passage the first health unit was established in Taylor County, a small rural county in west Florida. Although this unit was discontinued after a short existence, it was soon reinstated and there has been a steady growth of the county health unit system since the passage of the county health unit enabling act. Table 1 shows concisely the increase in the number of organized counties among Florida's 67 counties, the population and percentage of population served, the increase in funds available, and the number of personnel employed. Table 2 shows expenditures and per capita expenditures by source, for each of the 5-year periods since 1930. Figure 1 shows graphically the expenditures for county health units for the period and the source of funds, Federal, State and local. Figure 2 shows the per capita expenditures by county health units and the sources, Federal, State and local. In interpreting these charts it should be kept in mind that Florida's population has increased rapidly. According to the Federal census, in 1930, the increase was 1,468,211; in 1940, 1,897,414; and in 1950, 2,771,305.

It should not be assumed that per capita expenditures are uniform among the counties of the State. On the contrary, there is a wide variation. Local appropriations vary from a minimum of 34 cents per capita to a maximum of \$1.89 per capita; and the total of Federal and State funds allocated to local health departments varies from a minimum of 23 cents per capita to a maximum of \$1.78 per capita. State and Federal funds are distributed among the counties on a formula basis, according to the population of the county, the per capita amount decreasing with increase in population. In order to encourage local appropriations, the formula includes a matching factor so that larger per capita local appropriations are matched by somewhat more State and Federal funds. The smallest grant of State and Federal funds (1953-54) is \$3,915 and the largest, \$114,466.

Additional funds not shown in the tables and charts are also allocated on a project basis to 12 of the larger counties for special programs which are conducted on a regional basis. These programs include cancer, heart disease control, and mental health, and the total funds so allocated during the present fiscal year (1953-54) amount to \$99,900.

Direct aid to local health departments in

Figure 2. Per capita expenditures and source of funds of Florida county health units.



the school health program was brought about with the cooperation and agreement of all concerned. A law was passed which applied to Dade County only and which effectively removed any legal barriers to the consolidation. The law also set up an advisory board which functions as a local board of health except that it has no administrative functions or authority to promulgate regulations.

Under this plan the county undertook the entire responsibility for financing the operations of the health department, except for available Federal and State funds. This arrangement has worked out so satisfactorily that it has been used as an example of the benefit of consolidating the city and county governments entirely, and this development failed by a narrow margin in a recent election.

A similar development started somewhat earlier in Hillsborough County, whose chief city is Tampa. In spite of some opposition at first from rural areas and from one small town, the consolidation was promoted by the parent-teacher association because of a desire to have better school health services. Past efforts to carry on a separate school health program had not been satisfactory, and school officials were loathe to provide for an expensive school health program which would overlap the activities of the city and county health departments.

A few years later, and without much public fanfare, city and county officials in Pinellas County (St. Petersburg-Clearwater) agreed upon a consolidation, and effected it by legislative action. In this case, a local board of health was provided, the only one in the State.

Even before these consolidations took place, most of the smaller cities and towns in the State had effected similar arrangements by negotiation and agreement, and without special laws. In Pensacola and Escambia County, for example, a city-county health department was operated for years under a single health officer, with each agency paying its own employees. In recent years city, county, and State appropriations have been put into a common fund. While the trend in recent years has been for the counties to assume the entire local financial burden, in 1953, 27 municipalities contributed a total of \$65,890 to county health department budgets.

Consolidation has not meant that the cities of Florida lack health departments. Acting under specific agreements, and under the general policy of the State board of health, each county health department serves as the municipal health department for each municipality within the county, unless the municipality has a health department of its own. The county health departments are obligated to enforce municipal health ordinances, and in fact the county health departments would be greatly handicapped in their work but for the existence of such ordinances. This is particularly true in the field of milk and food sanitation where there is some dispersion of responsibility among State agencies.

At the present time only the city of Jacksonville has a complete and fairly adequately financed city health department. It has a budget of about \$500,000 to serve a population of more than 200,000 people. The cities of West Palm Beach, Orlando, and Lakeland have city health departments, but these furnish only limited public health services, and their combined budget for this purpose is estimated at less than \$100,000. Public health services in these cities are supplemented by the county health departments. It can be seen, therefore, that of a total of about \$4,339,320 spent by local health agencies in Florida only about \$665,000 is appropriated by municipalities, and most of this is spent by the city of Jacksonville.

School Health Services

Sentiment in Florida has always been against the development of separate school health services financed and administered by education agencies. In the past, many local school boards provided for school health services, particularly public health nursing services. There has been a continuous trend in recent years to discontinue this activity, or to merge such efforts with the county health departments. In many counties, the board of county commissioners bears the entire local cost of public health services, including school health services, but at present in 39 counties the local school boards make a contribution to the common fund of the health department. The total amount so contributed in the 1952-53

budgets was \$142,602. This assistance is especially important since it is contributed primarily in the smaller rural counties.

It is especially interesting that the Florida laws governing the expenditures of school funds provide that these can only be spent for local services where the county health department is unable to provide needed services. At the present time, in only 7 counties are public health personnel employed by school boards other than through county health departments. This personnel consists of 19 public health nurses and 1 health educator. In 1 of these counties, although 4 public health nurses are paid directly by the local school board they work under the supervision of the county health

officer. In the other counties, they work in close cooperation with the personnel of the county health departments, and the outlook for a complete merger of efforts in the future is very bright.

Summary

During the past 23 years steady progress has been made toward statewide coverage by county health departments, and only one county, with a population of 27,200, is now unorganized. Similar progress has been made in the coordination and unification of local health services provided by counties, municipalities, local school boards, and the Florida State Board of Health.

Birth and Early Days of Florida's First County Health Unit

By W. H. Y. SMITH, M.D., C.P.H.

WHEN THE Taylor County Health Unit was established in Florida during August 1930, it arrived, with the help of the Public Health Service, on a scene which was not only beginning to feel the full impact of a depression but which was already burdened by an abundance of malaria and hookworm disease.

From this county's swamp swarmed the *Anopheles quadrimaculatus* mosquitoes, and in its sandy soil thrived the hookworm larvae. It was a county rich in its land from the trees, yet poor in its soil that was cultivated. From its great sawmills and lumber towns came the money and from the country came the poor.

The health unit consisted of a motley group of "foreigners." To this unsuspecting community came a nurse from Tennessee, a sanitation officer from Massachusetts, the health officer from Canada, and a secretary who was the only native-born denizen.

In the beginning, the three moving pieces of personnel—the nurse, the sanitation officer, and the health officer—studied their maps and planned their strategy. Then they moved out

Florida's experience in developing local health services is reviewed by Dr. Sowder in the preceding paper. He speaks of 1930 legislation and establishment that year in Taylor County of the State's first local unit.

This informal account of the creation and early days of the Taylor County Unit is taken from remarks at the 1952 meeting of the Florida Public Health Association by the unit's first-health officer, Dr. W. H. Y. Smith, now director of the bureau of preventable diseases in the State Health Department of Alabama.

To pioneers and veterans of the local—and particularly of the rural—health movement, this vignette may evoke a degree of nostalgia. To some who have not had the privilege of working the back roads in some variety of shoe-leather epidemiology, nursing, or sanitation, it may even have an odd and distant tone. But to those who today are dealing, face-to-face, with problems of local health service, many elements and incidents in this flashback to two decades ago will seem remarkably current.

in their separate ways for personal appearances and good will tours in the county and were greeted quite often with blank stares and a thinly veiled hostility. Yet, there was always the one or the two, uninformed and hookwormy or malarial as he or they might be, who accepted the "pearls of wisdom" that were being dispensed and nodded vigorously and who, almost at once, became an ally and supporter. And with these allies and supporters the beginning was made in the communities.

Sanitation in the towns was relatively good and screening reasonably well done because the lumber industries through past years had learned or had been shown the worthwhileness of such things, and, too, most townspeople were used to such conveniences. But from the edge of one town to the edge of the next industrialized town and through those towns without industries there was a lack of these antihookworm and antimalarial facilities. And most of the people were ignorant in the ways of preventive medicine and health and were resistant to any and all innovations. "What was good enough for pappy is good enough for me" was their determined song. And the string trio of health workers were just as determined to play a new tune. But the tune was a simple melody. Funds were lacking for a great crescendo of music with brass and winds and piano for a mass attack of drainage ditch and privy building. Yet slowly but surely the nurse found her way into homes and the sanitation officer's spot map began to show evidence of privy building.

Then arose a new kind of resistance. The beautiful screened doors were kicked out because mamma couldn't get the door opened fast enough to throw out the dirty dish water or because the screens kept out the fresh air. And the privies went unused. Perhaps, the classic example of the latter was the family of eight who were filled to overflowing with hookworms. They lived deep in the country and were all potbellied and pasty faced. They were too sick for the usual remedy of carbon tetrachloride and so the new drug hexylresorcinol was used. During the several stages of treatment a new and shiny privy was built by the sanitation officer and his helpers, who explained the facts of privy life to the family. They

would nod their heads and smile in simple agreement, but the privy remained unused. One day, the old man explained why. They were so grateful for the return of their health that they couldn't possibly use the beautiful new house that the health unit had built for them for that desecrating purpose.

As a help in getting across the story of health, moving pictures were used. The traveling members of the unit would visit each home and invite everyone to the free pictures. In one home the nurse encountered stonewall resistance when the mother of a brood of hookwormy children said there was no such thing as hookworms, and if there was a moving picture of them it was made up because you couldn't take a picture of something that wasn't.

Interlaced with the educational programs and privy building were the hookworm treatment clinics. Through the schools, class by class, and in the homes, specimen tins were given out and carbon tetrachloride was given to the positives. The list was always long and at times, in some schools, there were no negatives. It was thought that repeated treatments might slow down the infestations even though the privy building program hadn't reached or wasn't yet accepted in the areas. Future survey proved this point.

The antimalaria program moved forward slowly. To accelerate it, quinine clinics were held throughout the county one summer. Once a week the people were met and given quinine capsules and instructed how to take them prophylactically. Neighbor told neighbor and the numbers at the clinic increased week by week. It appeared for a time that this type of clinic was being highly successful because of the crowds. But there was a flaw. Although they were only given enough quinine sulfate for the family for one week of prophylaxis, they didn't use it that way. This was discovered when one man at a clinic refused quinine, saying that he had enough now to last him for years. Apparently they didn't take the medicine as directed but put it on the shelf awaiting the time they would have chills and fever.

Inroads, of course, were made in the other communicable diseases but nothing was done about venereal diseases. Those were the days of men's doctors, secretiveness, and disgrace.

By the end of the first year, the unit was fairly firmly established with many people. But with the county commissioners it was different because the unit was dealing with new officials, not the ones who established it. There were two for, two against, and one on the fence. It was the one on the fence that had to be convinced. So at budget time the commissioner's room was filled with health unit supporters. The country people came on foot and in wagons, and the ones from industry and the clubs came in automobiles. And industry didn't send little wheels, they sent big ones. They all crowded into the little room—well-dressed men and women against a background of faded and patched overalls and shirts and snuff and chewing tobacco. It was hot and stuffy, and the unwashed bodies perspired freely with the washed ones until the commissioners were convinced.

Then the second year rolled around and

there was a repeat performance of the previous year. But industry didn't send such big wheels because it felt the health unit was old enough to stand on its own feet. It should have been, but the grapevine said the commissioners again were divided. But again the pressure was strong enough to continue the work for another year.

When the third year ended, it was decided to turn off the pressure. Either the past performance of health was apparent or it wasn't. To the people it was but not to the commissioners. They threw out the health unit, lock, stock, and barrel and replaced it with a nurse.

It is hard to express the feelings of a group of pioneers in health who tried to do a good job and succeeded only in being considered expendable and unnecessary. But bitterness and resentment were replaced as the feeling of success slowly seeped in again . . . for Taylor County remained without a health unit for just 1 year.

Public Health Service Staff Announcements

Dr. Lloyd D. Felton, an outstanding authority in bacteriology and immunology and a commissioned officer of the Public Health Service, died September 11, 1953. He devoted his entire career to laboratory research and medical teaching—at Johns Hopkins Medical School, Rockefeller Institute for Medical Research, and Harvard University's Medical School and School of Public Health. Dr. Felton's extensive studies of the virulence of bacteria led to the discovery of the Felton serum used in the treatment of pneumonia. Also, Dr. Felton discovered an antigen for immunization against pneumonia and introduced methods of standardization which enable physicians to determine the proper dosages of antibodies for the treatment of the disease. He contributed much toward the development of the sulfa drugs and during World War I made intensive studies of meningitis for the Army Medical Corps. He had been ill of a heart disease for more than 2 years. Before his illness, he was chief of the pneumonia unit in the Division of Infectious Diseases at the National Institutes of Health from 1938 to 1949. Dr. Felton's home was at 125 E. Thornapple St., Chevy Chase, Md. Burial was in Arlington Cemetery.

Dr. Albert M. Kessel, head of the pathological technology section of the laboratory of pathology, National Cancer Institute, Public Health Service, was killed in the crash of a Belgian airliner near Frankfurt, Germany, October 14. His wife and daughter were also killed in the crash. Dr. Kessel, with the National Cancer Institute since 1940, was on a vacation trip to Germany, where he was born in 1909. At the Institute, Dr. Kessel did research work in micro-anatomic fixation techniques and microscope slide staining methods. He was curator and assistant instructor in neuro-anatomy at the Mt. Sinai Hospital in New York City from 1929 to 1936.

Dr. Byron C. Brunstetter, secretary of the hematology and pathology study sections, Division of Research Grants, National Institutes of Health, was killed in a plane crash near Albany, N. Y., on September 16, while on an official trip, reviewing the projects of NIH grantees. Dr. Brunstetter had been with the Division of Research Grants staff since 1948, first as chief of the research fellowships branch. Since 1951 he had also served as chairman of the board of civil service examiners at the National Institutes of Health.

Public Health Aspects of Civil Defense

By DALE C. CAMERON, M.D., M.P.H.

MAJOR attacks upon the United States by an enemy possessing weapons of modern warfare could produce millions of casualties, making necessary the provision of both medical care and public health services on a scale unprecedented in the history of the world. Already much planning and preparation have gone into the organization of civil defense health services, but much more has yet to be done.

The primary considerations in this paper are the problems involved in providing public health services. Space does not permit a detailed analysis of the many problems involved in providing emergency medical care, but these problems are inexorably intertwined with the public health problems, as will be evident from the discussion. Basic to an understanding of the health aspects of civil defense is a knowledge of the nature of the threat and the requisites for an adequate defense.

Nature of Threat

The effectiveness and limitations of weapons which may be used and the targets susceptible

of destruction by these weapons are outlined below, and some comments are made on enemy capabilities and objectives.

Nature of Weapons

The weapons which must be taken into account in preparing for enemy health services include biological, chemical, radiological, and atomic warfare agents. Since the threat from atomic weapons has been discussed extensively elsewhere (1, 2), this discussion will be limited to other unconventional weapons.

Biological warfare agents include living organisms, toxins, biological products, and chemical plant growth regulators, which may be used to produce deaths or casualties in man, animals, or plants. The possible use of such agents as an instrument of warfare has intrigued the imagination of war planners for centuries. Although disease and epidemics among men have materially affected the course of many wars, recorded instances of deliberate attempts to affect the enemy are few. They provide no objective data on the use and effectiveness of biological agents in actual modern warfare.

Estimates of potential performance of biological agents must rest largely on extrapolation from preventive and treatment experimental data, epidemiology of accidental laboratory infections, hypotheses, and an extensive knowledge of man's ceaseless struggle against human, animal, and crop diseases during the ages. Since most of the problems of waging biological warfare are technical, it must be

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assumed that they either have been solved or that satisfactory solutions are possible. Civil defense today must therefore take into account the possible use of biological agents.

Chemical warfare agents include toxic chemicals, incendiaries, and smokes, which may be used to produce deaths or casualties in man, to destroy material, or to provide screening operations against enemy weapons or intelligence. Modern chemistry has added materially to the ways in which the ancient and potent weapon of fire can be used. World War I demonstrated conclusively that toxic chemicals also can be used effectively against man and animals. These facts plus the recent development of nerve gas make it imperative that civil defense preparations include provisions for possible attack with chemical agents.

Radiological warfare agents include radioactive materials, other than atomic bombs. These may be used to impair or kill man, animals, or plants, or to deny or impede access to contaminated objects or areas through threat of casualties. If these agents are used against this country, it would probably be primarily to deny or impede access to contaminated areas and to create confusion rather than to produce physical casualties. Radiological warfare is not viewed as nearly as serious a threat as biological, chemical or atomic warfare at the present time.

Viewed as antipersonnel weapons, biological and chemical agents could rival atomic bombs in destructiveness. From the public health point of view, the problems presented by the possible use of biological and chemical agents of warfare are at least as serious as those involved in possible radiological or atomic attack.

Nature of Target

The targets of these weapons are man, animals, crops, and physical things. Only atomic bombs, high explosives, fire, and certain chemical agents are particularly useful against both living and inanimate targets, but biological and other chemical agents could be used effectively against man, animals, and crops without destroying other things.

Considering man as a target, enormous num-

bers of casualties could result from overt attack with biological or chemical warfare agents, as well as with atomic bombs. Correct use of biological agents by saboteurs could cause large numbers of primary casualties and disruption among selected local population groups, but the secondary spread of disease among men after either covert or overt attack probably would not be especially great, particularly if appropriate public health measures are in effect. The covert use of chemical warfare agents presents more technical difficulties than such use of biological warfare agents.

Animals and fowls are seriously vulnerable to attack with biological agents, and the secondary spread of disease would probably be extensive and fairly rapid. The use of biological warfare agents against crops and forests also appears to present a serious threat if these agents are introduced at the proper time and place by either overt or covert means. The secondary spread of disease among crops and forests is also likely to be extensive, but the buildup would be slower than that among animals.

Enemy Capabilities and Objectives

The use of these special weapons against us depends not only on the vulnerability of targets but on the enemy's capabilities of production and delivery and upon his objectives and intent. Little can be said about enemy capabilities, but scientific knowledge concerning biological, chemical, and atomic warfare is not restricted to the free nations. Public statements have been made by Government officials to the effect that a potential adversary probably has the ability to deliver whatever weapons he has available (3, 4). Thus it is important not to underestimate enemy capabilities.

An enemy's objectives and intent, together with enemy capabilities and target vulnerability, play a vital role in our defense efforts. People will prepare to defend themselves against a particular threat only if they perceive it as real and relatively imminent. Perhaps some of our delay in the development of an effective biological and chemical warfare defense is predicated on a general belief that an enemy would not wish to use such agents on our vul-

nerable targets even if he had the weapons and means of delivery. Consideration of an enemy's objectives and intent is in the realm of pure speculation, but two points deserve mention.

One of these is the possibility of a future world war being based on a different concept from those of the past. The past two wars were waged primarily against things. An effort was made to destroy the productive capacity of nations, a concept brought sharply into focus by strategic bombing to destroy vital links in the production machine. True, men who were in the way were killed or injured, but the primary target, generally, was the industrial productive capacity. The result has been that many countries, victorious and vanquished alike, have required outside aid during the post-war period in providing food and clothing for their people and in rehabilitating their industries. Many of these postwar sequelae could be avoided by waging a war primarily against man, with the result that the survivors would be fewer in number and would probably have ample physical resources for their sustenance.

It may be argued that our enemies would not attempt to assist this country as we have tried to assist war-torn countries in the past, and this is probably true as far as humanitarian motives are concerned. But consider why potential foes would want to conquer this Nation. It seems reasonable to assume that their purpose would be to control our productivity in order that they might exploit our economy for their benefit. If this be true, then it also seems reasonable to assume that potential enemies might be interested in preserving, insofar as possible, our industrial capacity, and that, therefore, a future war might be against man rather than against things. Chemical and biological agents would become particularly attractive weapons in such a war.

A second point to be considered in speculating on enemy objectives is the fact that biological and chemical agents, particularly the former, lend themselves admirably to covert attack. The possibilities of weapons particularly useful as covert agents surely would not go unrecognized by an enemy who has a penchant for doing everything possible within his means, short of all-out war, to achieve his ends.

Requisites for Civil Defense

Both military measures and civil measures are necessary for the provision of an adequate defense against enemy attack with modern warfare weapons.

Military Measures

Dr. Lloyd V. Berkner in an address at the Minnesota World Affairs Center, University of Minnesota, on September 29, 1952, pointed out that the single most important military factor in our present foreign policy is the development of a strategic striking force (5). He noted further, however, that regardless of the merits of this concept, there comes a time when this approach is not enough. When an enemy has built up a sufficiently large striking force of his own to deliver a "knockout blow," the threat of retaliation loses much of its meaning. Thus, not only must this country develop a strong right arm, but it must also have an effective shield so that it may survive to use the strong right arm.

Such a shield is essential not only from the foreign policy point of view but also from the civil defense standpoint. Only with such a shield can the civil defense problem be made manageable. This country does not have unlimited personnel and physical resources to expend on civil defense efforts. If civil defense is to be successful, the magnitude of the task must be manageable. Any leak through our defensive shield must not completely inundate our civil defense system.

Civil Measures

In addition to the military measures precedent to a manageable civil defense, the following civil measures are essential:

Sufficient warning must be given of an overt attack, preferably of at least an hour, to allow civil protective measures to be taken. The provision of such warning, however, may well be a military rather than a civil responsibility.

Attack with biological or chemical agents must be detected promptly and the public immediately informed of the attack.

Proper protective devices, such as gas masks and shelters, should be available. Masks appear to be the single most effective and feasible

protective device against overt biological and chemical warfare.

Every individual must know what action is expected of him in the event of attack not only by atomic weapons but also by biological, chemical, or radiological weapons, which remain "unknowns" to most civilians. As such, they tend to cause widespread speculation as to their destructiveness and to engender unreasoning fear in many people. If civilians are to react rationally, they must have adequate knowledge about the nature of these weapons and their capabilities and limitations.

Health personnel must be prepared to deal with the emergency situation; plans for utilization of health facilities must exist; and certain medical supplies must be available.

Public Health Problems

Among the civil defense problems with which public health officials will be concerned are the provision of safe water; sewage collection and disposal; garbage and refuse storage, collection, and disposal; food sanitation; control of insects and rodents; household sanitation; detection and identification of illnesses; laboratory services; and prophylactic services. Most of these are essentially local community problems.

Public Water Supply

To maintain a supply of water adequate in quantity and pressure for fire fighting and, at the same time, to make sure that water does not become a vehicle for the mass transmission of disease, will be a major civil defense problem. Any decision to introduce unpotable water into the water distribution system for fire-fighting purposes should be made on the basis of policies developed jointly by the health, water, and fire departments. The problems occasioned by contaminated water supply systems must be carefully weighed against possible losses from fire. These departments should also collaborate on the development of alternate sources of water supply and measures to protect and repair the water system.

Provision should be made for the emergency purification of water by chlorination and other methods, using portable or fixed equipment, so that medical and other civil defense services,

hospitals, welfare mass-care facilities, restaurants, householders, and other consumers will be assured of an adequate supply of potable water. The public should be advised of measures which can be used during extreme emergencies to provide themselves with small amounts of safe drinking water, but reliance should not be placed upon the householders' efforts if it is at all possible to make other arrangements. Adherence to current standard methods of water purification will negate in large part any threat of contamination with biological warfare or chemical warfare agents introduced in advance of the purification process. Special, but not insurmountable, problems will be posed by the introduction of these agents beyond the purification plant. The only present protection is either the maintenance of a high residual chlorine in the water or the introduction of chemical neutralizing agents.

Sewage

Sewage collection and sewage disposal is not as serious a civil defense problem as might at first be imagined. It is possible that radioactive materials may be carried into the sewer lines and concentrated at the sewage plant, but this is, of course, of concern primarily to sewer works operators and maintenance crews. The disruption of treatment and disposal processes is not likely to produce significant health hazards.

The principal problem will be to prevent the contamination of water and food supplies with sewage from damaged sewers. Such contamination, however, may be prevented by such measures as pumping, temporary diversion, and improvised repair. In general, the repair of water systems would take priority over the repair of sewage systems, particularly of sewage treatment plants.

Garbage and Refuse

Normal collection services may be abandoned during emergency periods, and collection equipment diverted to more urgent duties. To prevent the development of insect breeding and other nuisances, community refuse handling agencies and health departments must plan to maintain certain minimum services: collection of dead animals and highly putrescible refuse;

designation of places for emergency storage (such as vacant lots or bombed-out buildings), with provision for the control of insects, rodents, and odors; and activation of emergency landfill disposal sites to supplement or replace normal disposal facilities. These measures are particularly important in the vicinity of emergency mass-feeding centers. Householders will need to know how to store or dispose of their own refuse until temporary storage points are established or until normal services are resumed.

Food Sanitation

The civil defense problem in food sanitation is to adapt the normal services of the health department and of the food industry to the dangers which will exist in an emergency. A particularly important task will be the supervision of food preparation at mass-feeding centers. Other tasks include evaluating possible contamination of food supplies by sewage, broken glass, biological, chemical, and radiological agents, and other extraordinary contaminants; implementing arrangements for decontaminating, segregating, or destroying such supplies; and arranging for the orderly opening and closing of restaurants and other public eating establishments in accordance with civil defense emergency feeding needs. Routine inspection for contamination with biological and chemical agents of all foods being used, however, is not considered feasible.

Insect and Rodent Control

Normal control of insects and rodents is usually accomplished by mobile teams of specialists working for health departments, community mosquito control agencies, or commercial rodent and pest control operators, but only a few persons and a limited amount of equipment are involved. The civil defense job is to organize these limited facilities so that they may be readily deployed wherever they may be needed, and to train assisting personnel recruited from outside the vector control field.

Household Sanitation

Household sanitation will be crucial during any civil defense emergency, for it must be expected that many of the sanitation services

which are now taken for granted will be disrupted. One of the most serious problems will be the disposal of excreta in the event of water supply or sewerage failure, particularly for apartment dwellers and others not having access to backyard burial facilities. Two types of containers have been suggested. One is a watertight vessel for the direct collection of all human excreta. The other is a small combustible permeable container which will allow the urine to filter out, thus reducing the volume to be stored and collected. A suitable permeable container is not currently available.

Emergency Lodging

The sanitation problems of emergency lodging are essentially those discussed previously, that is, water supply, refuse disposal, toilet facilities, and the like. In addition, health authorities must establish criteria on space allocation, ventilation, lighting, and safety precautions at entries and exits.

Epidemic Intelligence

Early detection and identification of illnesses which may result from covert or overt attack with biological or chemical agents and early clarification of the methods of dissemination are extremely important in minimizing the effects of attack and alerting for future covert attacks. The principal problem will probably be in the field of biological warfare, for the victims of modern chemical warfare agents should be readily recognized. Epidemic intelligence may provide the first clue that a covert biological warfare attack has taken place.

Local health departments ordinarily investigate unusual outbreaks of disease, encourage prompt reporting of infectious diseases by physicians and hospitals, and provide laboratory services for the identification of infectious agents. All these services will be necessary for epidemic intelligence; therefore, integration of the normal peacetime functions of health departments with civil defense activities is essential. Mobile epidemiological teams may be needed to assist local health departments in carrying out epidemic intelligence activities during an emergency.

Another important aspect of epidemic intelligence is the need for emergency research dur-

ing and immediately after any overt attack so that the nature and effectiveness of the weapons used and the effectiveness of the civil defense countermeasures can be evaluated. Such evaluations may aid in saving lives in future attack. Specific, scientific teams should be assigned to obtain the necessary data.

Laboratory Services

The many laboratories in local, State, and Federal public health agencies; in medical, dental, veterinary, and other teaching institutions; and in private and commercial organizations can provide the laboratory services needed during an emergency for the preservation and restoration of normal sanitation activities, for the identification of biological warfare agents, and in some instances for the preparation of immunizing materials. Clinical laboratory services for the treatment of hospitalized and nonhospitalized patients are present in most hospitals, but these will have to be expanded greatly to deal with the large numbers of casualties expected from an overt attack. The personnel in these laboratories are, of course, familiar with basic laboratory procedures, but it is essential that special training be given in the use of instruments and techniques for dealing with the chemical agents and exotic organism that may be used. Such training is necessary not only for existing personnel but also for the many auxiliary workers who will be needed.

Prophylactic Services

Atomic disaster would increase the spread of natural communicable diseases because of the disruption of sanitation services and the inevitable crowding of people under relatively poor hygienic conditions. If biological warfare agents should also be used, the dangers of disease spread would be further increased.

The National Research Council has recommended that all persons, adults and children alike, be immunized against tetanus because of the danger of infection following burns and other injuries. The Association of State and Territorial Health Officers, because of the practical difficulties involved in such a program, prefers instead to promote the immunization of children.

The practical limitations of any immunization program at this time are recognized, but it is suggested that the immunization of children against diphtheria and whooping cough and of both children and adults against tetanus and smallpox be encouraged and that substantial quantities of these immunizing agents be stockpiled against a future emergency. These stockpiles will be needed in the event of an actual attack and might be used even before an attack if the situation becomes so critical that people become convinced of the necessity for such immunizations.

Suggestions for Action

A few suggestions for action to meet some of the public health problems have been given in connection with the discussion of these items. There remain several broad recommendations affecting both public health and medical care problems which deserve special emphasis.

Local Casualty Estimates

In estimating the number of casualties, most of the local civil defense health service planning has been concerned with the physical casualties following atomic attack. Little consideration has been given to possible casualties from bacteriological and chemical warfare agents and to psychiatric casualties from any type of attack. It is believed that metropolitan area civil defense personnel should make estimates of such casualties on the basis of local and other information. It is suggested that estimates of psychiatric casualties from a sudden catastrophic attack might be predicated on a rate of approximately 1 such casualty for each 4 to 6 physical casualties.

Strengthening Local Services

Most local civil defense health organizations are not now ready to deal effectively with a major enemy attack directly involving the civilian population, although, of course, some are better prepared than others. Many programs are lagging seriously because of a lack of personnel with medical administrative experience who can devote full time to recruiting, organizing, and training a "hard core" of regular civil defense health workers.

The civil defense health service should be developed according to a phased schedule, involving motivation, planning, development of organization, and recruiting and training of leaders and workers. Emphasis at the present time should be on the development of a "hard core" of regular civil defense health workers rather than on the recruiting of millions of volunteers. School buildings and other structures should be earmarked for possible use as temporary hospitals and first-aid stations. Ocean-going, lake, and river vessels should also be considered as possible temporary hospitals. Health departments, particularly in urban areas, should bring their epidemic intelligence services to a high degree of proficiency.

Mobile Support

A marked disparity will undoubtedly exist between the number of trained personnel and physical facilities needed to provide even minimal civil defense health services and the number available, even if all present and projected health resources are available after an attack. Furthermore, an atomic attack could destroy most of the health personnel and facilities in the target area, and biological or chemical attack on an unprepared population could destroy or incapacitate most of the health personnel even though the facilities may be spared. *Thus, people in target areas surviving such attacks may have to rely almost exclusively on medical aid from outside the target areas.*

Local hospitals and health organizations have done very little planning for the utilization of outside aid, though many of them have given considerable attention to the vital first step of self-help. Accordingly, it is believed that local, State, regional, and Federal civil defense health planners should give increased emphasis to plans for mobile support by medical and public health personnel and for the use of medical facilities at a distance from target areas. The validity of such plans must be assessed by regional test exercises.

Rehabilitation Policies

The development of sound emergency health service plans could be accelerated by establishing national policy on such questions as the extent to which individual and community med-

ical rehabilitation is to be carried out or financed by Federal, State, and local official and voluntary agencies; the relation of medical rehabilitation to other rehabilitation activities; the nature of war risk insurance, if any. Health services which make optimum provision for the smooth transition from short-term emergency actions to long-term rehabilitation activities and which assure continuity of care for the injured depends on clarifying these problems.

Utilization of Health Manpower

Much remains to be done to assure maximum effectiveness in the use of the critically short supply of professional and subprofessional health personnel in all categories. The majority of treatment activities, short of surgery, will have to be carried out by technical aids under professional supervision. Therefore, careful study of medical, nursing, and other health functions necessary during an emergency should be made to determine which of the activities usually performed by professional and subprofessional personnel can be delegated to less highly trained volunteers working under competent supervision.

Basic Principles

The purposes of civil defense health services are (a) to minimize the extent and severity of, and provide treatment for, civilian casualties caused by enemy action and (b) to maintain the health of, and provide emergency noncasualty medical service for, evacuees and other individuals deprived of their usual medical care resources.

It is imperative, however, that the normal patient-doctor relationship be reestablished at the earliest possible moment after a disaster so that the current structure for providing health services be affected as little as possible. The established patterns and long-range trends in the provision of health services should not be modified unduly by the necessity to provide emergency mass treatment. It is also imperative that continuity of medical care be maintained for each casualty during the transition between the health emergency and rehabilitation phases.

These basic principles can best be applied by utilizing to the fullest extent possible existing civilian health services in providing emergency health services.

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Process for Extracting Andromedotoxin

Andromedotoxin, a pure compound with therapeutic possibilities in the treatment of hypertension, has been isolated from rhododendron leaves by a modified extraction process developed by two research groups of the National Heart Institute of the Public Health Service. The chemical structure of the drug is still unknown. Not a cure for hypertension, the compound may be useful in lowering the blood pressure in certain cases of hypertension. The compound has not been tested clinically, but trials at Emory University School of Medicine have demonstrated that it temporarily lowers blood pressure in animals. In low doses, it has a strong but brief hypotensive effect.

Special methods for extracting the material, precipitation procedures for eliminating unwanted substances, and chemical steps for purifying the compound by selective absorption were developed by the researchers.

To isolate andromedotoxin, fresh leaves of the native North America species *Rhododendron maximum* were first chopped, then boiled for an hour, and strained. In appearance, the brew changes during the extraction process from a substance resembling strong black coffee to one with the consistency of new-fallen snow. Of special interest to pharmacologists, the clumpy substance resembles the veratrum alkaloids in physiological actions, but unlike alkaloids, it contains no nitrogen.

More than 1,000 pounds of rhododendron leaves were required to make 1 ounce of the drug. They were collected by the United States Department of Agriculture in North Carolina and West Virginia. The isolation procedures were conducted at the Institute and the pharmacological work was done at Emory. Dr. Neil C. Moran reported on the research at the annual meeting of the American Society for Pharmacology and Experimental Therapeutics at New Haven, Conn., September 7, 1953.

Water, Sewage, and Industrial Waste Research Trends and Needs

By ALFRED H. WIETERS, M.S., and LEONARD B. DWORSKY, B.S.

ALTHOUGH the problems of sanitation are as old as man, scientific research in the water and sewage field is relatively new. It is a field in which the States have historically taken a leading part. The establishment of the Lawrence Experiment Station as a part of the Massachusetts Health Department in 1886 marked the beginning of the science of sewage disposal in the United States. Since those early days, similar experimental work has been undertaken by many of the other States.

It is appropriate that the States should continue to have a major role in this field. They have the knowledge of the factors in their own

environments—climate, health, natural resources, economic conditions, industrial and other relationships—that is necessary for the most effective research on problems relating to their own individual concerns. In addition the States are the best laboratories for trying and testing new sanitation developments, prior to adoption on a broader or even national scale.

Volume of Research

A complete listing of current research projects is not available. However, on the basis of information assembled from several sources (1-3), it appears that between 150 and 200 projects currently in progress in the States directly concern water supply, sewage treatment, and pollution control and about 100 additional projects deal specifically with industrial waste. Most of these are being conducted by college and university laboratories, and the rest by State organizations, technical associations, or private research institutions. Some of the projects are being supported in part by Federal grants, principally from the Public Health Service and the Atomic Energy Commission, with a few from the United States Bureau of Mines, United States Geological Survey, United States Army, and others. Many additional investigations on industrial wastes are, of course, being conducted by individual industries.

Even on the basis of admittedly incomplete

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This paper is based on material presented by Mr. Wieters before the Texas Water and Sewage Research Foundation at Austin on November 10, 1952.

information, it is apparent that in more than three-fourths of the States some research activity is under way in either the water and sewage or the industrial waste field. The extent of this activity ranges from 1 project to more than 25 separate studies in a single State.

The Federal Government has been an important factor in certain broad areas of research, either by conducting investigations in its own laboratories or by contributing largely to their support in the facilities of universities, States, industries, or private institutions. Such studies include those related to military developments and electronics; those concerned with the public domain, mineral resources, agriculture; a considerable part of health research; and other broadly based, long-term investigations in the purely theoretical area. The advances in fundamental knowledge stemming from basic research makes possible the applied and developmental progress in problem areas.

Public Health Research

In the public health field, systematic and continued scientific investigation as a recognized function of the Public Health Service began at the turn of the century, although some research was conducted as early as 1891 in the somewhat makeshift facilities of the Hygienic Laboratory. In 1901 Congress provided for the erection of a laboratory "for the investigation of infectious and contagious diseases and matters pertaining to the public health," and a division of scientific research was organized in the Service.

From the very beginning, attention was given to the relation of stream pollution to disease. It was not until 1910, however, that there was an organized, large-scale investigation in this field. At that time a study was made in the Great Lakes region of the relation of polluted water supplies to typhoid fever. This study was followed in 1912 by a pollution survey of the Missouri River. A short time later several temporary laboratories were established for field investigations, one of them at Cincinnati, and work on a plan for comprehensive stream pollution investigations was begun (4).

The Cincinnati laboratory, now the Environmental Health Center, has since been the focus for the Service's environmental research. Consistently, through the years, the investigations of the center have been those having general, rather than local, application, and those requiring the kind of continuous or extensive studies not likely to be undertaken by private agencies, or by State and municipal organizations.

Work currently in progress in water pollution and related areas includes development and evaluation of analytical techniques for both organic and inorganic materials; studies of persistence of particular organic compounds in water; application of biological oxidation processes to waste purification; studies of industrial waste sources, characteristics, and corrective measures; inventory surveys on pollution of water resources; development of biological methods for determining the severity and extent of pollution; studies of toxicity of water pollutants to aquatic life; development of bioassay methods and their application to pollution control; development of methods for control of organisms responsible for tastes and odors in water supplies; and studies of pollution and purification of shellfish in aquatic environments. Time and time again, these studies have resulted in significant developments that are now being widely used.

The Need for Basic Research

The importance of basic research to the Nation's security and continued prosperity was emphasized by experience during both World Wars. Since the turn of the century, the country has made rapid and continuous technological progress, advancing from an agricultural Nation to a highly industrialized world power. In many fields, however, technological developments were based principally on the basic and fundamental discoveries of the scientists of other nations, and our contribution was mainly applied and developmental. When the free flow of scientific information from Europe was cut off, we faced a serious deficiency in facilities and capacity for basic research.

Recognition of the inadequacy of this country's research programs led the President, in 1946, to appoint a Scientific Research Board to

review the current national situation and recommend a course of action which would insure that the scientific personnel, training, and research facilities of the Nation would be used most effectively in the national interest.

The board's report in 1947 indicated that the Nation was then spending \$1.1 billion annually for research. Only about 10 percent of that amount was for basic research. The board recommended that by 1957 the annual rate of total research expenditures be doubled, of health research, tripled, and of basic research, quadrupled. It further recommended the establishment of a National Science Foundation to establish research policy for the Nation and to administer Federal grants in support of basic research.

Such a foundation was established by the Congress on May 10, 1950. Subsequently, the foundation has reported that in 1951 the Nation spent an estimated \$2.5 billion for research and development (5), and in 1952, about \$3 billion (6). A preliminary report issued jointly by the Departments of Defense and Labor set the 1952 national outlay for scientific research and development at more than \$3.5 billion (7). Thus the Scientific Research Board's 1957 goal for total research has already been reached and passed. The unexpectedly rapid acceleration was due in part, of course, to the great increase in projects having military significance, stimulated by the defense buildup. A contributing factor has also been industry's growing awareness of the important role of research in expanding productivity and markets. To an increasing degree, industries are devoting substantial portions of their budgets to research and product development, such expenditures amounting in 1951 to \$1.2 billion. In view of the high returns now recognized as resulting from these outlays, the trend toward greater emphasis on industrial research is expected to continue (8). The cost of research conducted by the industries included in the Defense-Labor survey referred to above was reported as 2 percent of sales.

Health Research

Although the rate of increase in health research expenditures has been considerably less than that for total research expenditures, prog-

ress has been made toward the 1957 goal of \$300 million recommended by the Scientific Research Board. The latest published estimates indicate a total of \$181.2 million for 1951, an increase of about 60 percent over the \$115 million reported by the board in 1947 (9). The national totals for health research expenditures have not been broken down into subcategories which would permit a similar determination of the increase in water and sewage research. A committee exploring research needs in the somewhat broader area of environmental health reported in 1952 that it roughly estimated 1951 expenditures for research in that field at less than 10 percent of total health research (10).

An analysis of Public Health Service research expenditures (slightly less than 20 percent of the national total for health research), while not entirely representative of the overall situation, is meaningful. In 1952, about 2 percent of the total funds expended under Public Health Service research grants, and something less than 5 percent of the funds expended for direct research by Public Health Service staff, were allotted to projects in the environmental health field. These included, in addition to projects related to water treatment, water quality control, and water pollution, those covering various aspects of occupational health, air pollution, milk and food sanitation, radiological health, and such. In the 5-year period from 1948 through 1952, the number of environmental health grants increased about 40 percent and the amount of expenditures for such projects about 30 percent, as compared with increases of about 85 percent and 90 percent, respectively, in total public health research grants.

The report of a recent survey limited to projects dealing with treatment and disposal of sewage and industrial wastes and water pollution indicates that in the decade 1943 to 1953 the number of such projects increased from 128 to 148, about 16 percent. However the 1953 survey covered only the member institutions of the Engineering College Research Council, leaving for a later survey the projects being conducted directly by State health departments, interstate and intrastate agencies, industries, equipment manufacturers, municipal plants, trade associations, and others (3). Undoubt-

edly inclusion of those projects would materially raise the percentage of increase for the 10-year period, although it must be assumed, from the report of the earlier survey, that it, too, was incomplete.

Industrial Wastes

With respect to the problem of pollution caused by industrial wastes, specific responsibility rests upon the particular industries and plants that create the wastes. The Water Pollution Control Act (11) does, however, authorize the Service to support and aid research to devise and perfect methods of treatment of industrial wastes, and otherwise to help in solving the problem.

Industry has undertaken a considerable amount of research, over the years, looking toward the solution of specific industrial waste problems. Recognizing the need for concerted action, several branches of industry volunteered early in 1950 to form a national committee as a means of appraising and coordinating the work under way, promoting further research and development, and stimulating the adoption of known practical pollution abatement methods by all segments of industry. The National Technical Task Committee on Industrial Wastes, representing 36 major industrial categories, was organized in May of that year at the invitation of the Surgeon General.

The Service works closely with the committee, providing technical and consultative assistance and serving as a clearing house for the interchange of technical information. As one phase of this cooperative work, the Service has compiled and maintains on punch cards an up-to-date inventory of industrial waste treatment methods, problems, and current and planned research projects. The initial information for this inventory was provided by the member industries of the committee, which supply additional items as they develop, and has been supplemented by abstracts of pertinent articles and reports appearing in technical journals. The assembled information is made available to the committee through distribution of sets of the punch cards to each member.

Obviously, the coordinated research and pooling of information available from this

group, representing practically the entire industrial organization of the country, is of tremendous value.

Future Research Needs

The foregoing background is presented for the consideration of future research needs in the water, sewage, and industrial wastes fields. In determining specific research areas that most critically need attention, both now and in the future, special consideration must be given to the impact on water and sewage problems of such factors as: the expansion of industry; the development of new products; the depletion of our natural resources; the growth of population; increased urbanization; rising standards of living; increases in water requirements; increase in volume of wastes; the broadening concept of water resources development.

Industrial Developments

Perhaps the greatest number and variety of problems stem from expanding industry. Since 1900, production has increased more than seven times. Over half of that increase has taken place in the past decade. The President's Materials Policy Commission predicts that between 1950 and 1975 there will be another 100 percent increase (12). As the growing industrial machine has consumed raw materials at faster and faster rates, the threat of depletion of the less plentiful natural resources has furnished incentive for the development of many new materials from the abundant supplies of coal, air, and water—materials such as plastics, synthetic fibers, insecticides, and weedkillers. Production of these materials is adding quantities of wastes to our streams. As yet, there is no basis for even estimating what the volume of these wastes will be. The Materials Policy Commission reports that it is impossible to project production of those new materials as for established products, since these recent and continually growing industries have not yet found their stable place in the economy. Tentative estimates indicate that the production of synthetic fibers, such as nylon, orlon, and dacron, will increase from slightly more than 150 million pounds in 1950 to about 4 billion pounds in 1975; production of insecticides is expected to

double and of weedkillers to triple in that period; 1975 production of plastics is estimated at 9 billion pounds as compared with 2.28 billion in 1950; detergents may increase from 1.66 million pounds to possibly 4 billion by 1975 (13, 14).

In addition to the problem of manufacturing wastes, there is, for some of these products, the question of the effects their use will have on the basic elements of our environment. What will they do to the air and to the water when they are washed into the streams? For example, we do not yet know the extent to which present public water supply treatment methods will be effective against the chemicals now being placed in our streams as a result of use of new insecticides and weedkillers. The recent rapid development of chemical-producing industries in concentrated areas, as for example, along the east coast of Texas, has created air pollution and other difficulties that must be speedily overcome if the benefits of such growth are to outweigh the penalties.

The chemical industry as a whole is progressive, forward-looking, and conscious of its responsibilities to the communities in which it operates. It has spent large sums of money on research and equipment for preventing pollution of both air and water and there is good reason to expect that, as new problems arise, answers will be found.

Other industries, too, are becoming increasingly aware of the need for conserving water quality in order to insure an adequate future supply for their needs. They are also becoming more conscious of their public responsibility for disposing of the wastes they create in such a way that they will not damage these resources.

Population Growth

This country's population has doubled during the past half century. Current estimates indicate that by 1975 it will approach the 200 million mark. Along with this growth, there has been a continued trend toward concentration of population in urban centers. Sixty-five percent of the population is now urban, 35 percent rural. This trend can be expected to continue and the problems are expected to intensify as the Nation's industrial machine expands.

The problem of disposal or utilization of the

added volumes of both industrial and municipal wastes is in itself a staggering one. When the demands that will be made upon our water resources in the years immediately ahead are considered it is clear that the Nation cannot afford the inevitable reduction in usable water supplies that would result from discharge of these wastes, untreated, into the streams. The Nation's water requirements in 1975 are expected to be 90 percent greater than in 1950—almost double. Industry's needs alone may increase 170 percent, from 80 billion gallons per day to 215 billion gallons. Municipal and rural needs should increase 50 percent, partly due to increased population and partly to intensified use of modern appliances requiring water for operation—dishwashers, garbage disposals, automatic laundry equipment, and air conditioning.

These estimates are an indication of what the future will demand. The fact that there are many areas, even now, where the problem of adequate water supplies is becoming critical is forewarning that solutions must be found while there is yet time.

Most Needed Areas of Research

There are several areas of research that are obviously of major and primary importance.

New techniques must be developed for determining the amounts and kinds of pollution present in the streams, and the effects of such pollution on the receiving waters. With present analytical methods it is necessary to be satisfied with something less than the best determinations on the growing volume of wastes, many of which are the products of raw materials and processes that are outside our present experience.

Better yardsticks must be established for water quality objectives. Until more precise quality requirements are agreed upon for each of the various water uses—bathing water quality, irrigation, livestock, public water supply, industrial, and the others—we are restricted in our ability to determine which of those uses are attainable in each of the individual river basin areas and can thus be adopted as goals in developing comprehensive water pollution control programs.

Cheaper sewage treatment methods must be developed. There have been relatively few basic changes in sewage treatment methods over the years, although some attempts have been made to perfect and refine them. While the methods in use have been reasonably effective, there is an obligation to the public to reduce the cost of this public service if it is possible to do so. Scientific knowledge has made great advances since the present treatment methods were developed. Some of those advances should provide the basic principles from which could be developed better, quicker, and cheaper sewage treatment processes.

Methods for treating new types of industrial wastes must be developed. As stated earlier, this is basically the responsibility of industry itself. Those who develop the new manufacturing processes and products are the ones best fitted to solve the waste problems accompanying such development. For that task principal reliance must be placed on industry itself. Industry is best equipped also to look beyond the wastes and investigate the prospects of utilization, either by reclaiming raw materials or by developing byproducts.

Persons trained for this work are in short supply. The Nation is not producing enough technical personnel to satisfy its growing requirements. A solution to the problem of conserving and making full use not only of trained personnel but of laboratory facilities may be found in the more extensive use of regional, nonprofit, independent research organizations. Such agencies can provide corps of trained researchers who can give service to State governments, to industry, and to others interested in sponsoring investigations in various fields. They are able to undertake jointly sponsored research leading to the solution of many of the common problems that face industries and local governments in areas where rapid development is taking place. They can act as a clearing house for new scientific information in such areas.

A recent summary of 1950-53 growth of 7 independent research organizations (which together account for more than 1 percent of the Nation's total research outlay) gives evidence of the increasing use being made of this type of organization. Collectively these 7 regional

centers have doubled their business volume in less than 4 years (15).

There is need for integration and coordination of research studies and findings. Research organizations and workers must be constantly aware of studies under way in other areas that might produce results affecting their own investigations. As an illustration, consider the work in progress on removal of salt from sea water in order to open up new water supply sources. Thus far, no economically feasible method has been perfected, but the project has progressed beyond the merely theoretical stage. In a law passed in 1952 (16), the Department of the Interior was directed to further pursue the investigations. Excessive processing cost is an important hurdle in attaining the objective. Closely allied studies are concerned with the extraction of usable minerals from the ocean. In the search for new sources of rare materials, attention has turned to sea water, sea life, and the ocean bottom. Practical methods have already been found for extracting some of the wealth that we now know the ocean holds. For example, bromine and magnesium are being economically recovered from sea water. The development of economical recovery techniques will add many others. All of these endeavors will move more rapidly if the researchers in each field keep informed of developments in the others. Every usable material that can be added to the list of those obtainable from the sea, every feasible combination of processes for their extraction, will lessen the cost for each and bring closer the possibility of economical operation.

Multiple-purpose use. We need to project our vision beyond its horizons, which perhaps have been too limited by our concentration over the years on the narrowly defined public health aspects of water and the relation of waste treatment to public health per se. We need to have a deeper appreciation of the multiple-purpose concept of water use, and to apply that concept to our work. From a long-term view, this is a relatively new concept. It has been an outgrowth of basic legislation developed over the past half century—the Reclamation Act of 1902; the Tennessee Valley Authority Act, adopted in 1933; the Flood Control Law of 1936; the Water Pollution Control Act of 1948.

This kind of development of our water resources was foreseen by Theodore Roosevelt when he wrote (17) :

Every stream should be used to its utmost. No stream can be so used unless such use is planned far in advance. When such plans are met, we shall find that, instead of interfering, one use can often be made to assist another. Each river system, from its headwaters in the forest to its mouth on the coast, is a single unit and should be treated as such.

Under this concept, the water problem takes on a new perspective. Programs encompass entire basins; all water uses—domestic, industrial, agricultural, recreational, fish and aquatic life, waste disposal—are factors in a total regional planning process rather than separate entities related only to a particular water or sewage plant. Under this concept our sights are raised past the boundaries of the communities which those plants serve.

In actual practice, the States are attaining this broadened perspective through the increasing use of regional councils and interstate compact groups for joint consideration and solution of their common water problems.

As plans are developed on broad basin areas, the water needs of industry, of the population, of agriculture, and of other users must be compared. The benefits from those uses must be weighed. The possible advantages of changing existing priorities—as between industrial, agricultural, and other uses—must be given careful consideration. If the full benefits of river basin development are to be realized, water quality must be conserved.

Adequate basic information is essential to meet the growing need for developing the Nation's water resources in a way that will best serve all the people. We need more rainfall and stream flow records, particularly low flow records; we need additional data on the physical, chemical, and bacteriological characteristics of the raw water in our streams. We need up-to-date facts on the economics behind the various water uses.

Development of better procedures for assuring that research findings are utilized is an

urgency. Too often, the active interest of those who have completed a research study ends with their report of findings. There should be an additional step in the research process, a following-through by those actually producing the findings, to assure that new knowledge is channeled to those who need it. This requires the development of closer relationships between those engaged in research of a physical nature and those working in the social and political science fields. In the area of research dealing with water and sewage, for example, there should be cooperation with agencies such as the bureaus of governmental research in universities, and the organizations providing service to governmental agencies—the International Association of City Managers, the Council of State Governments, and the like. The use of periodicals in the political science, social science, and economic fields, in addition to those in the sanitary engineering and public health fields, as a means of communicating certain kinds of research findings might aid in the development of such relationships.

Careful interpretation of findings and their presentation in a way that will permit their most effective use at the operating levels are also important elements in this followup procedure. The important point is that in order to get the maximum value from research expenditures, we must not only take responsibility for actually doing research, but must also make certain that the knowledge provided by research reaches those who can make effective use of it.

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Dr. Meister Wins 1954 Chemistry Award

Dr. Alton Meister, head of the clinical biochemical research section, laboratory of biochemistry at the National Cancer Institute, was selected to receive the 1954 Paul-Lewis Laboratories award in enzyme chemistry. The award, consisting of a gold medal and \$1,000, is given each year by the American Chemical Society to the outstanding American enzyme chemist under the age of 40.

Dr. Meister, who is 31, won the award for discovering the mechanisms by which normal tissues and cancer tissues cause the exchange of chemical groups between amino acids and the breakdown products of sugar and for discovering that vitamin B₆ is necessary in this exchange. Glutamine, an important compound present in almost all tissues, was found to be the key substance in many of these reactions. In the course of his experiments, a number of new compounds called "keto acids" were isolated in crystalline form for the first time, and the way in which the body converts them into amino acids was determined. These studies may be helpful in explaining the growth processes of cancer cells.

Previous Paul-Lewis awards were won in 1953, 1952, and 1951 by Drs. Earl R. Stadtman, Bernard L. Horecker, and Arthur Kornberg, all of the National Institutes of Health, Public Health Service, Bethesda, Md.

Environmental Health in a Rural Economy

By MARK D. HOLLIS, C.E.

PROGRESS in environmental health in rural areas has lagged behind improvements in urban living. Rural sanitation, though it has advanced considerably in recent years, has lagged behind other forms of material progress even in rural areas, and, in certain respects, the rural environment in the past 10 years has deteriorated. Such deterioration is observed not only in the lack of maintenance of originally satisfactory installations, it is found also in new installations in fringe urban areas where, for example, septic tanks have been employed under unsuitable conditions.

Public health in the city is affected by rural health. The food of the population as a whole depends on the productive efforts of a small rural minority (1). In view of its economic importance and in view of the tendency of rural youth to move to cities, the rural population's health should be at least as good as the health of urban dwellers. There is a prospect that the productive powers of the rural population must be increased by all means possible to feed a growing population (2). Moreover, in an age of automobiles and planes, the communication of disease between rural and urban areas is swift: it is folly to expose any part of

the population unnecessarily to channels of infection (3). The lack of rural sanitation imperils not only the country dweller but also the many millions from the city who visit rural recreational areas.

Sanitation as an Investment

The speed and direction of change in our times has not spared the rural economy. In older agrarian societies where the life cycle seemed to repeat itself from season to season, traditional customs and techniques were seldom questioned. But modern technology has stepped up the tempo of every isolated farm and quiet hamlet. Rural life has grown so much more complex that it becomes necessary not only to meet present sanitation needs but also to prepare to meet needs of the future. At present, we think of the rural dwellers who come to the city. For the future, we may think of the possibility of a dispersion from cities to rural areas as a technique of civil defense (4).

The emphasis on economic factors in environmental health is prompted by knowledge that vital statistics have so much to do with earning a living (5). We work to produce the essentials of life which make it possible for us to work. At the same time, improvements in health do not necessarily increase productivity; nor does every economic gain necessarily contribute to health. The relation between health and economics is not simple. While it may be assumed generally that every investment in health is returned many times over to the economy, it is practical to ask how to invest money in health

Assistant Surgeon General Hollis, chief engineer of the Public Health Service, used the data in this paper in July 1953 in discussions with the WHO Expert Committee on Environmental Sanitation, in Geneva. This paper deals with conditions in the United States only.

so as to secure the greatest return per dollar. The value of the return itself must be gauged not only by morbidity statistics but also by statistics indicating a change in levels of consumption, productivity, and social welfare. To determine whether the gain from rural sanitation is worth the cost in each area is not to question whether it pays to save a life. The question is how, with available resources, investment in rural sanitation can secure a satisfactory return in the abundance and richness of human life.

Rural Attitudes

About a third of the population is rural. A sixth of the Nation live on farms: these feed the lot of us and some abroad, too. About 30 million other rural Americans live in villages of less than 2,500 or in even more isolated circumstances. They include loggers, fishermen, trappers, miners, retired elders, and commuters. Half of the rural population lives in the south, where a fourth of the farm families are non-white. The total rural population exceeds 55 million.

Obviously, the needs of the rural population vary from house to house. Also, the operations to finance and administer sanitation programs for this population are bound to vary. The necessity for tailoring sanitation operations to peculiar local needs places the main responsibility upon local authorities, and often on the individual family.

Government is ordinarily held responsible for financing public health services in the city. This is not so in the country. Sanitation of food and premises is clearly a public problem in the village and in other rural centers such as the school, church, and grange or community hall. But in most rural areas in the United States, sanitation is ordinarily regarded as an individual or private concern, even though many individual rural families cannot finance sanitation by themselves. If there is the will to bring rural demands for environmental improvement into balance with the demand for cars and electricity, however, the economic devices that provide cars, telephones, and power are capable of financing pipes and drains as well.

In the city, the danger of contagion has created awareness of community responsibility. In rural areas, the danger of contagion is less apparent. It is recognized mainly in the enforcement of sanitation on dairy farms, in the effort to protect the safety of fluid milk produced for the urban market. Hygienic milk production is probably the heaviest single contribution of its kind to rural environmental health in the United States. Tests of village water supplies by State and county health departments may rank next.

Factors in the Lag

Three major factors in the lag in rural sanitation are the relatively high cost of water and sewerage systems for isolated structures, the usual necessity to finance each installation individually at relatively high rates, and the absence in many rural areas of a strong public health authority. These factors have less force in the village than on the farm.

Isolation, an important factor in protecting the health of the rural family, especially the farm family, also imposes penalties, especially penalties of a social nature. For example, among farm families with an annual income of more than \$10,000, it is found that 1 in 8 lives without running water in the house, and 1 in 30 lives in a dilapidated dwelling. Presumably, in an urban environment, these same families, stimulated by the example of their neighbors, would be much more likely to occupy homes reflecting their economic status.

The great majority of farm families, however, are not usually in a position to finance environmental improvements even at modest interest rates. To relieve their situation, there must be a narrowing of the gap between costs and capacity to pay, as a consequence of higher earnings, technological progress, or favorable financial devices. Most nonfarm rural families are only slightly better off. Environmental health services may be contributory to economic gains in rural areas, but first there must be economic devices to improve the rural environment.

Such devices have in fact contributed to rural improvements, including lighting, refrigeration, cleaning, smokeless cooking, and

milk sterilization. According to the United States Department of Agriculture index, American farm living improved 25 percent from 1940 to 1945. The improvement was 37 percent in the southeast. This index grades living levels on the farm according to the value of its products and the presence of an automobile, electricity, and a telephone. All these factors are important in the economy and welfare of the farm. The important factor of water does not figure directly in the index, although health levels are affected by the simple availability of water. Both the living level and the productivity of the farm family depend on easy access to water for such purposes as washing, bathing, irrigation, cooling facilities, and a water-carriage disposal system.

Health and Health Facilities

Much of the recent literature on rural health touches only lightly on the environment. There has been a tendency to assume that the books on rural sanitation were closed with the decline of interest in hookworm. Even malaria control in rural areas is regarded by a few as a closed chapter. It has been more fashionable to speak of rural health wholly in terms of clinics, physicians, and nurses. Important as personal health services are, however, they do not reduce the value to family health of running water in the house, safe shelter, proper waste disposal, and protection against vectors of disease. Such environmental factors, covered here in the comprehensive term "sanitation," can contribute directly to rural health and indirectly to rural personal health services. If rural areas gain in health and productivity through improved sanitation, they will be less in need of other health services, and they will also more readily obtain and afford the other services they should have—nurses, physicians, and clinics.

The more rural the area, the fewer the health personnel, services, and facilities are in proportion to the population. At present there are public health organizations in approximately 1,600 of the 3,071 counties in the Nation. Most of these provide some service to rural areas. The counties that are not organized for direct full-time health services hold less than a fourth of the national population, but these counties

are predominantly rural. They contain 30 percent of the national rural population.

Some explanation for the slow trend in farm sanitation may be found in the studies which determined that village residents suffer more enteric infections than farmers (5). These studies suggest that the need for sanitation is less urgent on the farm.

The negative trend in village sanitation is laid to the unplanned construction of new homes without regard to the needs for water or waste disposal. About 40 percent of the new homes built in recent years are served with septic tanks rather than with sewer lines (6). In addition to the burden of maintenance, such installations require a proper regard for the suitability of the soil, the water table, and the density of the population.

In the past, the rural environment has been considered more healthful than the city, an assumption which must be qualified today. Relative healthfulness of environment depends on what places and conditions are compared. Even on the fundamental issue of the quality of the atmosphere, many a rural dweller is more exposed to dust, fungi, or pollen than an urban dweller who works and sleeps in an atmosphere which is filtered, humidified, and cooled or warmed to order.

Although the romantic appeal of the rural environment is strong, it is tempered by epidemiology. In 1900, the registered death rate among farmers was only half the urban death rate (7). Since then, however, living conditions in the city have been improved, and there has been a strong movement of relatively healthy and vigorous young people from rural to urban residence. Consequently, the death rates registered in rural and urban areas today are about equal. Death rates for mothers and infants are higher in rural areas than in cities. As to the death rates from enteric diseases, these are associated with a lack of water-carriage sewage facilities, a lack that is common in rural areas. Recently, in one county, the death rate from dysentery and diarrhea was 169.3 per 100,000, in contrast with a national average of 5.9 (8). This range suggests how sanitation may affect rural health. Hookworm in certain rural areas is found in more than half the population. The simple availability of running water for

convenient washing of the person has a relation to health that is so obvious it is readily overlooked.

Sanitation in the broad sense applies to all facilities and practices that concern public health, and, for this reason, the records on accidental injury are pertinent. Opportunities for serious injury on farms seem greater than in cities; disabling conditions among farm workers are one and one-half times greater than among industrial workers. Accidents on farms kill 14,500 and injure an additional 1.3 million yearly (9). Although concern with accident prevention in rural areas has activated the United States Department of Agriculture, manufacturers of farm machinery, distributors of electrical power and equipment, farm youth organizations, the National Safety Council, and various rural educational leaders, the accident problem is not appreciably controlled. At the University of Michigan School of Public Health a comprehensive survey of accident experience among the population of Washtenaw County, conducted in 1951-52, revealed the home accident injury frequency of urban dwellers to be 5 per 100, as compared with 11 per 100 for rural dwellers.

Physical Sanitation Needs

It is difficult to appraise the educational and physical needs of rural sanitation. An inventory of health facilities prepared by the Public Health Service in 1947 estimated that rural physical sanitation needs included repairs to existing water supplies or development of new supplies, chiefly wells, for more than 6 million homes where facilities were either lacking or insanitary. More than 7 million homes required improved sewage disposal. In terms of the affected population, more than 27 million people in rural areas needed new or improved water supplies, and 33 million had unsatisfactory sewage disposal facilities. There was a measurable difference between rural and urban areas in the quality of the water supply.

In 1950, piped running water inside the home was available in 96.4 percent of urban dwellings and in 42.7 percent of farm dwellings. Piped water was running in 68 percent of the rural nonfarm dwellings. In round numbers,

Housing facilities

Condition	Percentages of occupied ¹ dwelling units		
	Urban	Rural non-farm	Farm
Dilapidated ²	6. 5	13. 4	19. 5
No running water in or outside the home.....	1. 7	28. 6	54. 6
Outside toilets.....	6. 8	41. 4	65. 6
Structure more than 30 years old.....	46. 4	39. 0	53. 4
Noncentral heat.....	35. 9	67. 9	80. 7
Wood cookstove.....	2. 4	15. 4	38. 7
Kerosene cookstove.....	4. 8	11. 6	8. 9
No icebox or refrigerator.....	4. 0	16. 1	25. 5
No kitchen sink.....	5. 3	26. 5	45. 2

¹ 42.5 million occupied dwelling units.

² A dwelling unit is classified as dilapidated when it has serious deficiencies, is run down or neglected, or is of inadequate original construction, so that the dwelling unit does not provide adequate shelter or protection against the elements or it endangers the safety of the occupants. Dilapidated dwelling units are so classified because of deterioration, as evidenced by the presence of one or more critical deficiencies or a combination of minor deficiencies, or because of inadequate original construction, such that they should be torn down, extensively repaired, or rebuilt.

SOURCE: U. S. Department of Commerce Census of Housing, 1950.

pipd water was lacking in 1.1 million urban dwellings, in 3.1 million rural nonfarm dwellings, and in 3.6 million farm dwellings.

Rural homes are more crowded than urban homes. In 1950, the percentage of dwellings with more than 1.5 persons per room was 10.2 on the farms, 8.6 in rural nonfarm dwellings, and 4.7 in urban dwellings. The relation of crowding to contact diseases, such as tuberculosis and pneumonia, has been revealed in many studies, including the National Health Survey of 1936.

Comparisons in housing facilities offer further grounds for reflection upon the differences between urban and rural health (see table). The heating and cooking facilities indicate the relative extent of fire hazards. Other hazards to safety are suggested by the degree of dilapidation and age. The icebox figures may have significance for nutrition and food poisoning.

And the nature of the water and toilet facilities may be indicators of the extent of enteric infections.

It seems apparent that rural health is poorer than it should be. Medical surveys have found the rural population relatively high in incidence of brucellosis, septic throat, enteric disorders, and insectborne disease (10).

The Rural Economy

Rural life is being transformed by population growth, by decentralization of industry, by modern communications, and by a broadening desire for the security that is attached to a piece of land. The farm economy also has been transformed by a series of strong markets, advances in agrobiological, electrified communication and mechanization, and a high degree of specialization suitable to given locations and markets.

According to the 1950 census of agriculture, there are more than 5 million farms. This number includes cattle ranches, groves, dairies, greenhouses, apiaries, mushroom cellars, and cranberry bogs. Nearly a third of these farms are part-time or residential farms whose occupants do not contribute materially to commercial agriculture. More than two-thirds of the operators had other income amounting to more than receipts from farm produce sales.

Of the commercial farms, more than a fourth specialize in field crops. Less than one-seventh of the commercial farms are classified as "general" farms.

Crop specialization influences the size of farms, although the wealth and enterprise of the owner, the dictates of geography and climate, and such legal provisions as those in the homestead or reclamation laws are also factors in determining farm size. A wheat farm, for example, takes more acreage than a pecan grove. Although the average size of an American farm is 215 acres, nearly 3 farms in 5 (56 percent) are smaller than 100 acres; 2 in 5 (36.5 percent) are under 50 acres. Only 5.7 percent have more than 500 acres, and most of these are in 17 western States.

The foregoing figures merely hint at variable situations to be met in a rural sanitation program. The following facts may indicate how

conditions of tenure, income, wealth, and social status influence the opportunities for sanitation.

The Virtue of Ownership

The amount of money invested in a farm, or its capital value, is bound to affect a banker's judgment as to the desirability of investing additional funds in sanitation. There is distinctly a heavier investment in farms operated by owners than in farms operated by tenants. According to the 1952 survey of consumer finances published by the Federal Reserve Board, 69 percent of the owner-operated farms were valued above \$10,000. The corresponding figure among farms operated by tenants, managers, or sharecroppers was 22 percent. At the other end of the scale, only 1 percent of the owner-operated farms but 59 percent of the non-owner-operated farms were valued below \$2,500. These valuations include land, buildings, machines, and inventory.

Although nearly 1.5 million farms in 1950 were operated by tenants or sharecroppers, the trend in American farming since 1930 has been away from tenancy and toward ownership. The percentage of farms operated by the owners has increased since 1930 from 56 to 72 in 1950. The percentage of dwellings occupied by owners in 1950 was 66 on farms and 63 in rural non-farm units. Quite a variety of farm credit programs have assisted tenants in becoming farm owners and have contributed to improvement of rural sanitation. However, the differences between sanitation facilities of owned and rented homes are less pronounced than differences related to farm value, income, location, or ethnic factors.

The relationship of tenure to dilapidation is obvious. Of 5,721,000 occupied rural farm dwellings reported in 1950, nearly 4 million were owner-occupied, and 2 million were rented. About a fourth of the tenant homes were dilapidated (see table). Most of these lacked running water. About 12 percent of the owner-occupied farm homes were dilapidated as compared with 17 percent for all occupied farm dwellings. Of the farm tenant homes in good condition, almost half were lacking in running water. Rented farm homes were more crowded than homes occupied by the owners.

Capacity to Pay

Farm income is probably the best indicator of the capacity to pay for sanitation. In 1949, by prewar standards a prosperous year, 3 out of 5 farm families reported net cash income of less than \$2,000. The median farm income of \$1,730 contrasts with \$2,560 for the rural nonfarm family and \$3,430 for the urban family in that year, even though it does not include any allowance for noncash income in the form of food and shelter provided on the farm. The maximum net cash income on nearly a third of American farms in 1946, also a prosperous year, was less than \$750.

Even when off-farm income is combined with farm income, including noncash income, it appears that in 1946 two-thirds of the farms accounted for about 92 percent of the farm family income from all sources. Ten percent of the farm families obtained 40 percent of the total income. The capacity to pay for sanitation on an individual basis was most restricted among that third of the farm families which share only 8 percent of the farm income.

Of the farm families with incomes of less than \$1,000, according to Census Bureau calculations of 1950, almost one-third lived in dilapidated homes. Two-thirds of the non-dilapidated homes in this income group lacked running water, and more than nine-tenths of the dilapidated homes occupied by this group lacked running water. Conditions were only a little better in the group, almost as large, with incomes from \$1,000 to \$2,000. These families with incomes below \$2,000 compose the majority of the farm population. Even if it is assumed that the extent of poverty in rural areas has been overstated, as it may have been, the maximum net cash income of the less prosperous farmers provides no great surplus to invest in the costs and charges described below for environmental facilities.

Ethnic Factors

Ethnic and social factors also have a bearing on the sanitation of rural dwellings. Such factors create particularly acute problems for a high proportion of nonwhite Americans, including native American tribes (17), and for

about a million migratory workers (12). The migrants' problem is particularly difficult because of their transient residence. They assume living expenses not ordinary in a settled community, and, because of temporary residence, they are unable to gain eligibility for local welfare and health services.

While housing generally has become less crowded in the period from 1940 to 1950, for the nonwhite farm population the number of persons per dwelling actually increased. More than 80 percent of the dwellings of the rural nonwhite population have outside toilets, and more than 40 percent lack running water. No toilets at all are found on the premises of 13.7 percent of the nonwhite farm population as compared to 6.4 percent for the white farm population. To report that sanitation in a given ethnic group is below average, however, does not suggest that the aspirations and potential achievements of this group may not be as high as any other.

Sanitation Costs

Costs of sanitation, in terms of out-of-pocket charges, must be recalculated for each separate project. The following figures give merely a rough idea of their probable magnitude.

In 1947, the Public Health Service estimated per-capita costs for provision of community water facilities in towns of less than 1,000 would range from \$35 to \$58, and sewage disposal systems would cost a bit more than \$60 in such areas. The cost of installing needed minimum individual rural sanitation facilities, such as a privy and a hand pump on a shallow well, was estimated to range from less than \$10 for each member of the population in New England and on the Pacific Coast to more than \$20 in parts of the south, where the needs were greater and where the degree of urbanization was less.

A 1948 estimate of the cost of constructing a house sewer, septic tank, distribution box, and 100 to 200 feet of absorption trench for a rural sewage disposal system gave figures which ranged from \$110 in the southern United States to \$525 in the north. The level of construction costs today is somewhat higher. Estimates for cleaning such a system range from \$14 for the simplest of operations to \$300 for operations

involving, for example, taking up and replacing the tile distribution system.

Fifteen years ago, the sanitary pit privy cost roughly from \$20 to \$40 each in prewar dollars, the equivalent of from 50 to 100 man-hours. The greater part of the cost was for materials.

At present, a shallow well with a hand pump costs \$75 or more to install. A privy usually costs a similar amount. Three-fourths of the cost is for labor. The cost of a pump alone today ranges from \$4 for a simple manual pump to more than \$500 for a heavy duty power pump. Construction cost index numbers are roughly twice as high today as in 1938.

Costs of vector control have been calculated for specific projects. Malaria control in our southern States uses $2\frac{1}{2}$ man-hours and more than a pound of insecticide per dwelling per season. Ordinarily, the cost of residual spraying works out to less than \$1 per capita in these States, with labor charges the major factor. Typhus control in urban or village areas uses two-thirds of a man-hour and about $2\frac{1}{2}$ pounds of DDT dust per dwelling. Because of the appearance of resistant strains of insects, health departments cannot rely completely on chemical controls. Rat and fly control are directly associated with refuse disposal, but sanitary disposal of refuse in rural areas is laggard.

The economical approach to hookworm disease appears to require concentration on *afflicted families, rather than a mass approach*. At the same time, since a high iron and protein diet supports resistance to hookworm disease, mass economic improvement appears to be a means as well as an end in the process of hookworm control (13).

Costs of accident prevention, an important phase of sanitation, are not calculable on the basis of common experience, at present.

Administrative Considerations

Education also must be counted in the cost of sanitation. The economies of rural sanitation cannot be separated from the desires, needs, and interests of the people affected. Time and effort invested in helping the rural community to understand the need, purpose, and use of environmental health services also contribute

to the installation and maintenance of the necessary facilities. Too many installations go out of operation for lack of maintenance and repairs. Similarly, an installation may be wasted unless there is a parallel investment in developing local understanding and participation in an enduring sanitation program. Education is a major factor in the conquest of many rural hazards, both biological and physical.

In theory, a logical, orderly, and economical development of rural sanitation would begin with individual surveys to determine the environmental health needs of each rural home. These needs would be weighed against capacity to finance construction and installation.

In practice, the task of determining needs is handled more often by equipment and supply salesmen and the consumer than by health departments.

About the best that can be done by responsible health authorities or community leaders in this situation is to try to bring about a mutual understanding among the many parties interested in sanitary installations and services on both the buying and selling ends and to help them secure the required financial assistance. More and more, the businessmen themselves may develop systematic packaging and marketing of complete sanitary units for the rural household to improve random marketing of pumps, screens, concrete tanks, pipe, sinks, and tubs. The technical advice of health officials would contribute materially to this development.

The rural credit program as a whole has given less emphasis to sanitation than meets the need. Although the bulk of farm credit is provided by private lending institutions, several Federal agencies provide guaranties and other facilities for obtaining credit at moderate interest rates.

Credit for farm development, including sanitation, has been supported by the Federal Government since 1916. Several thousand units of low-rent public housing in rural areas have been built under credit supports provided by the United States Public Housing Administration. Loans and grants to improve private rural housing were authorized to the extent of \$19 million for administration in 1952 by the United States Department of Agriculture through the Farmers Home Administra-

tion. The funds were all committed within a few months. The Farmers Home Administration also issues loans to assist farm tenants to become farm owners, and it assists owners to develop farm property.

While these loans are not necessarily profitable, similar credit operations of the Department, through the Farm Credit Administration and the Rural Electrification Administration, have been self-supporting. Loans have always been available from REA for financing rural plumbing. And home construction loans by the Farmers Home Administration are issued under sanitary standards consistent with those recommended by public health agencies. If rural credit programs are assisted to a greater extent by the advice and resources of health authorities, it may be expected that rural sanitation and welfare will advance the more rapidly.

The experience of the Rural Electrification Administration suggests a time schedule that might be applied to rural sanitation. Electric power from a central station is provided on 90 percent of the farms in the United States. In 1935, only 10.9 percent of farms were so electrified, only 0.9 percent in the least developed States, and only 53.9 percent in the best. The percentage of electrified farms in each State today ranges from as high as 98.9 to no lower than 65. Judging by the pace of rural electrification, it should be possible to satisfy the bulk of environmental health needs in rural areas within a generation.

NOTE. Unless otherwise indicated, the economic statistical data are taken from tables published by the United States Department of Commerce, the United States Department of Agriculture, and the Federal Reserve Board. An extensive list of references on the general subject of rural health is available from the United States Department of Agriculture Library (Rural Health; Annotated list of selected references; Library list No. 60, 1953).

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Services of Preventive Medicine

To an Observed Population

Public Health Monograph No. 16 contains data on personal preventive medical and related services for each member of a group of families canvassed monthly over a 5-year period, 1938-43, in the Eastern Health District of Baltimore. The services recorded were dental care, eye refractions, immunizations, complete physical examinations, and checkups following surgery or medical treatment or exposure to communicable disease.

Maximum dental cases and visits occur under 20 years of age but rates were high from 5 to 30 years of age. Rates for fillings, prophylaxis, and crowns and bridges, are highest under 20 years of age, and decline thereafter. Extractions and X-ray have their highest rates in middle life; plates, at 40 to 50 years of age. Except for the young and old ages, females have considerably more dental service at each age. Persons with higher incomes received more dental service than those with lower family incomes. Similarly, persons in professional-business-clerical occupations received more dental care than those in manual occupations. The proportion of dental care received in public clinics decreased rather regularly and considerably during the 5-year period.

Of all eye refractions, 47 percent were done by optometrists or opticians, 33 percent in clinics, and 20 percent by private physicians, of whom about two-thirds were eye physicians. The age curve for eye refractions shows two peaks, 10-14 and 45-54 years. At every age except the oldest, the refraction rates were definitely higher for females than for males. For females, refraction rates are highest in Sep-



Public Health

MONOGRAPH

No. 16

The accompanying summary covers the principal findings presented in Public Health Monograph No. 16, published concurrently with this issue of Public Health Reports. The authors are with the Division of Public Health Methods, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

• • •

Collins, Selwyn D., and Phillips, F. Ruth: Dental, eye, and preventive medical services. Public Health Monograph No. 16 (Public Health Service Publication No. 290). 28 pages. Illustrations. U. S. Government Printing Office, Washington, 1953. Price 20 cents.

tember and February, but rates for males show little regular seasonal variation.

Well-baby and child care, complete examinations, and checkups are definitely more frequent in clinics than in private practice, 68 to 84 percent being done in public clinics. However, less than half of prenatal care and postpartum examinations were done by clinics. In the frequency of these examinations, all except those relating to pregnancy and the puerperium were highest under 20 years of age, and well-baby and child care was largely under 5 years with a peak at 1 year of age. Age-adjusted rates for complete examinations increased with income but the opposite was true of checkups. Age-specific rates for well-baby and child care, particularly under 5 years of age, decreased rapidly as income increased.

Smallpox, diphtheria, and whooping cough annual immunizations amounted to 106, 97, and 26, respectively, per 1,000 children under 10 years of age. During the 5 years of the study more than half of the first 2 immunizations were done in public clinics, but 99 percent of the whooping cough immunizations were done by private physicians. Diphtheria and whooping cough immunizations were done at the earliest ages, the peak rates occurring under 1 year of age followed by a rapid decline. Smallpox vaccinations occurred at roughly the same frequency in each single year of age under 5 years, with a moderate drop thereafter. Smallpox and diphtheria immunizations per 1,000 children under 5 years of age decreased regularly as the family income increased but the opposite was true for whooping cough.

1,300 Projects Completed

To date 1,300 projects under the Hospital-Survey and Construction Program have been completed and put into operation. More than 700 projects are under construction, with 120 in preconstruction stages. Cost of all construction now totals more than \$1,700,000,000. Communities and States have supplied more than \$1 billion of this amount. The Federal Government's share is nearly \$600 million.

Final 1952 Report On Tuberculosis Morbidity United States and Territories

A total of 109,837 tuberculosis cases was newly reported in the continental United States during 1952, according to final reports received from State health departments. This figure represents a decline of 7 percent from the total reported in 1951. Part of this decline is accounted for by changes in the types of cases reported.

This is the first year in which new tuberculosis cases reported have been classified as group A (active and probably active) and group B (arrested and other reportable cases), as recommended by the State directors of tuberculosis control at their 1951 meeting in Cincinnati (1). Although the types of cases reported as group B vary widely from State to State, those reported as group A are fairly uniform. Group A tuberculosis cases newly reported to State health departments during 1952 totaled 85,607—an annual rate of 55.0 per 100,000 population.

The number of active and probably active cases reported in 1952 for each of 6 States was estimated because of the incompleteness of classification, which had a bearing on the count of active cases. Some of these States, however, have since adopted new morbidity reporting procedures so that all States probably will provide information on the number of newly reported active and probably active tuberculosis cases during 1953.

The accompanying table gives the data from the States and Territories. The newly reported active and probably active tuberculosis cases per 100,000 population varied among the States from a high of 164.0 for Arizona to a low of 16.4 for Nebraska. The rates for Alaska and

This report was prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.

New tuberculosis cases reported, United States and Territories, 1952

State or Territory	Total newly reported tuberculosis cases	Newly reported active and probably active (group A) tuberculosis cases		State or Territory	Total newly reported tuberculosis cases	Newly reported active and probably active (group A) tuberculosis cases	
		Number	Rate per 100,000 population ¹			Number	Rate per 100,000 population ¹
Alabama.....	2,448	1,375	45.1	New Jersey.....	3,769	2,234	43.8
Arizona.....	2,865	1,409	164.0	New Mexico.....	1,026	680	93.8
Arkansas.....	1,840	1,481	78.9	New York.....	11,661	11,386	75.0
California.....	8,232	8,232	72.3	North Carolina.....	2,000	1,565	37.4
Colorado.....	1,206	495	34.6	North Dakota.....	206	206	34.3
Connecticut.....	1,317	935	44.5	Ohio.....	7,228	5,124	62.7
Delaware.....	245	149	44.1	Oklahoma.....	1,574	1,165	51.4
District of Columbia.....	1,885	1,217	145.7	Oregon.....	863	598	37.5
Florida.....	2,603	2,002	64.6	Pennsylvania.....	5,213	(²)	² 44.2
Georgia.....	1,985	1,947	55.4	Rhode Island.....	408	347	42.5
Idaho.....	230	173	28.5	South Carolina.....	1,251	862	40.5
Illinois.....	5,019	4,481	50.2	South Dakota.....	191	140	21.1
Indiana.....	1,900	1,683	41.0	Tennessee.....	3,851	2,131	65.4
Iowa.....	689	506	19.1	Texas.....	4,385	(²)	² 53.5
Kansas.....	470	461	23.0	Utah.....	163	153	20.8
Kentucky.....	2,562	2,276	78.1	Vermont.....	382	171	46.0
Louisiana.....	2,330	(²)	² 62.1	Virginia.....	4,228	(²)	² 84.6
Maine.....	419	380	43.0	Washington.....	2,497	1,223	49.6
Maryland.....	2,720	(²)	² 72.4	West Virginia.....	1,221	1,141	58.5
Massachusetts.....	2,397	(²)	² 35.9	Wisconsin.....	1,483	1,058	29.9
Michigan.....	6,152	4,066	60.6	Wyoming.....	96	56	18.2
Minnesota.....	2,230	821	27.2	Continental United States.....	109,837	³ 85,607	³ 55.0
Mississippi.....	1,233	1,139	52.4	Alaska.....	956	743	408.2
Missouri.....	2,302	2,086	51.4	Hawaii.....	620	350	67.0
Montana.....	324	192	32.5	Puerto Rico.....	6,236	5,510	246.0
Nebraska.....	231	225	16.4	United States and Territories.....	117,649	³ 92,210	³ 58.1
Nevada.....	130	121	67.2				
New Hampshire.....	177	149	27.7				

¹ Rate based on population as of July 1, 1952.

² A definite count not available for the entire year; rate computed from estimates based on incomplete data.

³ Includes estimates for 6 States with incomplete data.

SOURCE: Annual tuberculosis reports and other reports from States and Territories.

Puerto Rico were substantially higher than the rate for Arizona. No doubt part of the difference in rates reflects the relative effectiveness of case finding and reporting in each State. On the other hand, it seems probable that large

differences in the rates generally indicate actual differences in the incidence of the disease.

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Membrane Filter Procedure Applied in the Field

By EDMUND J. LAUBUSCH, M.S., EDWIN E.
GELDREICH, M.S., and HAROLD L. JETER, M.A.

IN THE PLANNING of public health procedures appropriate for field use or in the event of a natural or wartime disaster, there is a recognized need for quick detection of bacterial pollution of water supplies. For this purpose, application of membrane filter techniques has been proposed, primarily because the 4 to 5 days required to perform coliform enumerations can be reduced to 18 to 20 hours by use of the membrane filter, without apparent loss of validity of results.

Application of the membrane filter in an emergency implies that the tests be completed under field conditions, with minimum availability of standardized laboratory equipment and supplies. It is recognized, also, that in certain situations there may be need for culture incubation by other methods than conventional laboratory incubation. Previous descriptions (1, 2) of EHC Endo medium have specified preparation of the medium on the day of use, thereby necessitating probable preparation under field conditions. In addition, the fragility of glass petri dishes renders them of questionable value in such operations.

The studies which are reported here dealt with (a) a specially designed garment to incubate inoculated membrane filters, utilizing body warmth as a source of heat; (b) the applicability of more durable containers to field-culture methods; and (c) the feasibility of using stored, fully prepared Endo medium to avoid the necessity of mixing the medium in the field.

Mr. Laubusch is a sanitary engineer with the Division of Sanitation, Public Health Service, Washington, D. C.; Mr. Geldreich and Mr. Jeter are bacteriologists with the Environmental Health Center, Cincinnati, Ohio.



Garment for incubation of inoculated filters by body heat of wearer.

Sample Filtration

Equipment suitable for membrane filtration has been adequately described (1-4). All the filtrations in this investigation were made in the laboratory, in order to compare the "field type" of test with the laboratory test as a control procedure. An electric vacuum pump was the only piece of equipment used that might not be available in a disaster area. Samples of water were collected in bulk and were filtered within 2 to 3 hours from the time of collection.

Use of the standard metal or glass-holding apparatus is feasible for field work. The differential pressure across the membrane can be obtained by using a hand-operated bicycle pump with the leathers reversed, a rubber bulb aspirator, or an evacuated container. Field sterilization of the apparatus can be accomplished by immersion for 5 minutes in boiling water, by flaming alcohol, or by the incomplete combustion of methyl alcohol (1, 2, 5). Re-sterilization of the filter holder between filtrations of successive samples is not usually re-

quired. Rinsing down the funnel walls with a small amount of sterile water two or three times, after sample filtration but before removal of the membrane, reduces the residual micro-organisms to insignificant levels.

Culture Containers

A satisfactory container should: (a) be non-breakable, of chemically inert material which can be easily cleaned; (b) be suitable for sterilization either by heat or by chemical procedures; (c) have air- and water-tight seal, to prevent leakage of medium, contamination, or loss of humidity; (d) be convenient to use, inexpensive, and readily available.

Probably no single type of container fully meets all of these requirements. Two types of containers have been examined extensively with regard to the above criteria. One was an ordinary 2-oz. ointment tin, 50-60 mm. in diameter, available from most laboratory equipment distributors, large drug stores, or drug supply companies. The other was a disposable plastic petri dish, 50 mm. in diameter. Tests using these containers were run in parallel with the 60-mm. glass petri dishes routinely used in this laboratory for membrane filter studies.

Culture Media

All membranes were incubated for 2 hours on M-enrichment medium (Difco) followed by transfer to EHC Endo medium for final incubation of 16 to 18 hours. The EHC Endo medium used in the medium storage experiments was kept in screw-capped tubes until time for use.

Sterilization Procedures

In these investigations, a laboratory autoclave was used to sterilize all materials. For field use, a pressure cooker (such as is used for home-canning purposes) could be substituted.

Equipment, such as funnels, metal containers, and graduates, was sterilized for 15 minutes at 121° C. (15 lbs.). Whenever it was necessary to dry this equipment rapidly, the escape valve of the autoclave was opened to reduce the steam pressure.

(The plastic petri dishes could be sterilized

by soaking for 2 hours or longer in 70-percent ethyl alcohol. The alcohol must be allowed to drain from the dishes before using them.)

The membrane filters were separated from the kraft paper dividers (leaving the white blotting paper inserts in place), wrapped loosely in kraft paper (about 10 to each package), and sterilized in the autoclave for 10 minutes at 115° C. (10 lbs.). At the end of the sterilization period, the escape valve was opened to reduce the pressure in the autoclave to atmospheric pressure. (This was essential to protect the membranes from excessive moisture.)

The enrichment medium and EHC Endo base were autoclaved 15 minutes at 121° C. The 20-percent lactose solution was autoclaved 10 minutes at 115° C.

Field Incubation

The incubation assembly (see photograph) consisted of a sleeveless, vestlike garment, adaptable to a torso of almost any size and equipped with adjustable elastic strappings to hold the garment in place and to permit maximum dexterity of the operator. The vest, worn in direct body contact for maximum heat transfer, held 21 incubation containers in pouches located on the front side. Incubation containers were inserted vertically into these pouches so that the bottom (thus, the nutrient pad and membrane) was closest to the body and was separated from the skin by a nylon marquisette fabric which formed the inner lining of the garment. The front side of the pouches was lined with nylon-faced, rubberized cloth to minimize heat losses. A heavy-grade cotton oxford cloth was used as an overlay veneer and extended around the back of the torso, where it was fastened.

Experimental tests consisted of body incubation of inoculated membranes, contained in metal and plastic containers, for the established periods. Parallel tests were made with membranes cultured in glass petri dishes and incubated in a laboratory high-humidity incubator at 35° C.

Results

In table 1, quantitative coliform recovery in the metal and plastic dishes is compared

Membrane Filter Procedure Applied in the Field

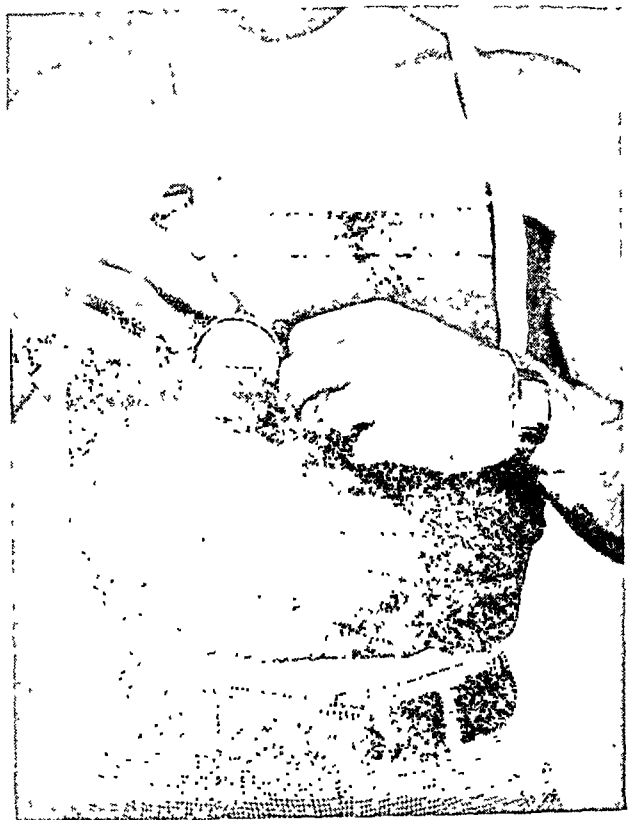
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Experimental tests consisted of body incubation of inoculated membranes, contained in metal and plastic containers, for the established periods. Parallel tests were made with membranes cultured in glass petri dishes and incubated in a laboratory high-humidity incubator at 35° C.

Results

In table 1, quantitative coliform recovery in the metal and plastic dishes is compared

with recovery in the control test, in which glass dishes were used. Counts are average values of duplicate membranes. All water samples were from farm wells.

Average coliform counts of four replicate samples from a group of rural well waters incubated in the conventional, constant-temperature, high-humidity incubator, and a parallel series incubated at body temperature in the incubator vest, are shown in table 2. Both types of containers, the ointment tin and the plastic petri dish, were used in this evaluation.

Coliform recoveries on stored EHC Endo medium, as compared with the results from freshly prepared EHC Endo medium, are shown in table 3.

These values were based on four replicate filtrations for each of the two media.

Discussion

Comparison of coliform recovery results from the tin and from the plastic containers (table 1) with the recoveries from standard glass petri dishes indicated that any of these containers could be used interchangeably. Lab-

oratory observations demonstrated no consistent variation in either colony size or quality of the characteristic sheen of coliform colonies.

Both the plastic dish and the metal container satisfied most of the criteria outlined for optimum field performance. It was shown that these containers could be incubated in any position without interference from spreading growth caused by condensed moisture falling on the membrane. There appeared to be sufficient adhesive power in a properly saturated nutrient pad to keep the membrane in a fixed position on the bottom of the container. The containers were sufficiently tight to prevent evaporation of the nutrient and to preserve a sufficiently humid atmosphere. (However, several containers were not leakproof, so that medium did seep out. This resulted in staining the incubator vest and occasionally the clothing worn adjacent to the vest.)

Other discomforts to the wearer were associated with continuous wearing of the vest, such as heat buildup and difficulties in sleeping. Under nonemergency conditions, some other means of supplying suitable temperatures, for example, a portable incubator or thermos jar,

Table 1. Average coliform recoveries from experimental tin and plastic containers in relation to standard glass containers

Ointment tin containers				Plastic containers			
Sample No.	Coliforms/100 ml.		Recovery ratios ¹	Sample No.	Coliforms/100 ml.		Recovery ratios ¹
	Standard test	Experimental test			Standard test	Experimental test	
1-----	2, 000	2, 300	1. 15	11-----	37	55	1. 49
2-----	600	420	. 70	12-----	900	700	. 78
3-----	180	140	. 78	13-----	220	270	1. 23
4-----	320	330	1. 03	14-----	4	4	1. 00
5-----	260	270	1. 04	15-----	300	320	1. 06
6-----	360	310	. 86	16-----	100	110	1. 10
7-----	140	160	1. 14	17-----	13	14	1. 08
8-----	540	490	. 91	18-----	7, 200	8, 600	1. 19
9-----	33	50	1. 51	19-----	35	29	. 83
10-----	280	300	1. 07	20-----	120	110	. 92
Average-----			1. 02	Average-----			1. 07

¹ "Recovery ratios" are the ratios of the mean number of coliform colonies in the experimental culture containers to the mean number of coliform colonies in the conventional glass Petri dishes (standard test).

Table 2. Average coliform recoveries from tin and plastic containers using conventional and body incubation

Sample	Ointment tin containers (coliforms/100 ml.)		Recovery ratios	Sample	Plastic containers (coliforms/100 ml.)		Recovery ratios
	Standard incubation	Body incubation			Standard incubation	Body incubation	
1-----	220	220	1. 00	11-----	660	530	0. 80
2-----	2, 300	2, 800	1. 22	12-----	880	1, 000	1. 14
3-----	420	540	1. 28	13-----	270	270	1. 00
4-----	140	240	1. 71	14-----	380	530	1. 39
5-----	330	300	. 91	15-----	320	300	. 94
6-----	260	300	1. 15	16-----	110	130	1. 18
7-----	300	270	. 90	17-----	14	18	1. 29
8-----	170	170	1. 00	18-----	8, 600	9, 200	1. 07
9-----	480	640	1. 33	19-----	1, 100	1, 500	1. 36
10-----	50	50	1. 00	20-----	29	32	1. 10
Average-----	-----	-----	1. 15	Average-----	-----	-----	1. 13

may better serve the purpose of incubation in field examinations of water supplies.

Steam or hot-air sterilization of the metal culture containers resulted in development of scale and rust after repeated use. Both types of culture containers were considered to be disposable, and could be taken into the field in a sterile condition, used once, and discarded. The low cost of these containers made the practice economically feasible.

According to the data in table 2, it appeared that when the body served as the source of heat, coliform recoveries were equal to those obtained from conventional incubation. Colonies incubated by body heat were noticeably smaller, necessitating occasional extension of incubation time to insure complete development and optimum differentiation of coliform colonies. The smaller size often was advantageous, because it helped to minimize interference with coliform differentiation due to overcrowding and confluence of colonies.

Frequent random temperature observations in the pouches of the incubation vest, made over a 6-week period in which the vest was used, indicated maintenance of a relatively constant and uniform temperature range. The limits were 33.5° C. and 35.5° C.

From the data in table 3, it appeared that

limited-duration storage of the EHC Endo medium had no discernible effect on quantitative coliform recovery. Similarly, colony size and sheen characteristics appeared not to be adversely affected with storage up to 3 or 4 weeks. Thus, fully prepared Endo medium, previously mixed in the laboratory, can be taken out into the field for medium-transfer purposes.

These results suggest application of field incubation procedures to small-scale surveys in remote areas where accurate results must be obtained quickly by starting or completing incubation at the sampling site. The body incubation modification is particularly applicable

Table 3. Average coliform recoveries on stored and freshly prepared medium

Number of days stored	Recovery ratios of stored Endo media at—	
	Room temperature	4° C.
19-----	0. 96	0. 93
25-----	1. 09	. 96
28-----	1. 15	1. 02
32-----	1. 09	1. 00

to civil defense activities and disaster relief, where laboratory facilities may not be conveniently available.

Conclusions

1. Both tin and plastic containers possess the merits of simplicity, mechanical durability, and membrane filter adaptability.

2. Equally satisfactory results are obtainable by use of the metal or the plastic container as a culture dish for membrane filters.

3. The incubator vest is an acceptable device for utilizing body heat for the incubation of membrane filters under field or emergency conditions.

4. The EHC-modified Endo medium may be stored for 3 or 4 weeks without destroying the usefulness of the medium.

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Public Health Service Staff Announcements

Dr. Harold M. Janney has been appointed medical director of the Bureau of Prisons, Department of Justice. Since 1950 Dr. Janney has been medical director of the United States Penitentiary, Atlanta, Ga. He has had progressively responsible appointments in the Federal prison system since his initial Public Health Service assignment as medical staff officer at the Federal Reformatory, Chillicothe, Ohio, in 1936.

Dr. Joseph O. Dean, formerly associate chief of the Bureau of State Services, Public Health Service, on September 15 was named as an assistant to the medical director of the Bureau of Indian Affairs, Department of the Interior. Prior to his assignment as associate chief in 1949, he served as district director and regional medical director of Region VII, with headquarters in Kansas City, Mo.

Dr. Dean was appointed to the Regular Corps of the Public Health Service in 1929, and received his master of public health degree in 1937 from the Johns Hopkins School of Hygiene and Public Health. During his career, he served at quarantine stations in New York and New Orleans. From 1937 to 1941 he made studies of public health administration in rural areas and also of the activities of various county health departments. From 1941 to 1944 he was stationed in San Juan, Puerto Rico, as medical consultant.

During World War II, Dr. Dean was concerned with activities relating to emergency health and sanitation, serving first as assistant chief of the Division of States Relations and later as chief of the Office of Surplus Property. From October 1946 to October 1947, he was assistant chief of the Division of Commissioned Officers.



Demographic Characteristics of Latin America

Limited and brief though it is, this review emphasizes the magnitude of the disease problem in Latin America. It supports the thesis that the population is young, that mortality rates are high (especially in the early years of life), and that infectious and parasitic diseases are responsible for most of the morbidity and mortality drain on the population.

MOST OF THE TERRITORY of the Latin American Republics lies between the Tropic of Cancer and the Tropic of Capricorn. During the decade 1942-52, the Institute of Inter-American Affairs cooperated in the field of public health with 18 of the 20 countries in this region. Fourteen of these 18 countries are wholly within the Torrid Zone. Only one, Uruguay, is completely in the Temperate Zone. The remaining three lie partly in both zones. It is therefore to be expected that tropical or subtropical diseases would be found in almost all of these countries. In the areas of high altitude, which characterize the Andean regions in particular, the diseases are likely to

be those of a Temperate Zone, though the region lies completely in the Tropics.

The *Servicios*, therefore, were confronted with both temperate and tropical disease problems. The characteristics of the problems were not difficult to define, but their magnitude was less readily determined. The reasons for the latter stem, in considerable part, from the inadequacies of the morbidity and mortality data available. By using both direct and indirect evidence, however, it was possible to formulate a reasonably true picture of the disease problems.

Mortality Rates

Data on the number of deaths and the death rates in seven Latin American countries for 1942 and 1949 (table 1) indicate that considerable improvement in health conditions has taken place during this 7-year period. When these data are compared with comparable data for the United States (table 1), however, it is evident that these countries are in a position to benefit still more from intensive efforts to improve health services. For example, the crude death rate in Chile in 1949 was 2.2 per 1,000

This material on demographic characteristics and that following on specific diseases and nutrition are the sixth and seventh in a series of excerpts from the report on the Public Health Service's evaluation of a decade of cooperative health programs of the Institute of Inter-American Affairs. The background of the report and of these excerpts will be found in Public Health Reports for September 1953, beginning on page 829.

Table 1. Number of deaths and death rates per 1,000 population in selected countries (stillbirths excluded)

Country	1942			1949		
	Population (in thousands)	Number of deaths	Death rate	Population (in thousands)	Number of deaths	Death rate
Mexico.....	20, 657	471, 600	22. 8	24, 448	¹ 438, 300	¹ 17. 9
Nicaragua.....	1, 023	17, 186	16. 8	1, 184	11, 910	10. 1
El Salvador.....	1, 849	38, 250	20. 7	2, 150	28, 339	13. 2
Chile.....	5, 130	104, 122	20. 3	5, 712	103, 384	18. 1
Colombia.....	9, 469	151, 809	16. 0	11, 015	154, 662	14. 0
Peru.....	7, 272	92, 804	13. 4	8, 240	¹ 85, 406	¹ 10. 8
Venezuela.....	3, 906	63, 528	16. 3	4, 595	57, 477	12. 5
United States.....	134, 831	1, 385, 187	10. 4	149, 149	1, 443, 607	9. 7

¹ Provisional data.

SOURCE: Statistical Office of the United Nations, Demographic Yearbook, 1951.

population lower than the rate in 1942; yet in both years the Chilean rate was about twice that for the United States.

By Age

More significant than general death rates are the rates by age and by cause of death. The data in table 2 show that people in the five Latin American countries shown are prone to

die young. The mortality rates for the first year of life and for the succeeding 4 years are uniformly high in comparison with the rates for the United States. These rates are known to be susceptible of substantial and rapid reduction by effective health services. The evidence, therefore, leads to the conclusion that uniformly effective health services have not yet been developed in most of these countries.

Table 2. Death rates per 1,000 population in selected countries, by age (stillbirths excluded)

Age group (years)	Mexico 1940	Nicaragua 1940	Chile 1940	Colombia 1938	Venezuela 1941	United States 1940
All ages.....	23. 3	14. 4	21. 5	17. 3	16. 2	10. 8
Under 1 year.....	205. 3	93. 0	239. 9	150. 5	126. 9	54. 5
1-4.....	48. 2	23. 2	31. 5	28. 5	21. 3	2. 9
5-9.....	7. 9	5. 3	2. 8	5. 8	5. 2	1. 1
10-14.....	4. 0	2. 4	3. 3	3. 1	¹ 4. 1	1. 0
15-19.....	6. 0	4. 1	6. 6	4. 5	-----	1. 7
20-24.....	9. 0	6. 6	9. 4	6. 2	² 8. 3	2. 4
25-29.....	10. 0	7. 9	9. 5	7. 1	-----	2. 8
30-34.....	11. 5	8. 9	10. 1	8. 5	³ 11. 4	3. 4
35-39.....	13. 2	9. 0	10. 9	9. 7	-----	4. 4
40-44.....	15. 4	11. 0	12. 9	⁴ 12. 7	⁴ 15. 1	6. 1
45-49.....	18. 0	13. 1	15. 5	-----	-----	8. 7
50-54.....	21. 6	14. 5	19. 3	⁵ 18. 8	⁵ 21. 5	12. 8
55-59.....	27. 1	19. 0	27. 3	-----	-----	18. 6
60-64.....	40. 4	24. 7	35. 4	⁶ 35. 6	⁷ 58. 1	26. 8
65-69.....	54. 8	42. 4	53. 9	-----	-----	39. 2
70-74.....	84. 7	55. 4	72. 5	⁸ 93. 2	-----	61. 1
75-79.....	108. 0	98. 0	103. 1	-----	-----	94. 8
80-84.....	161. 1	98. 8	134. 2	-----	-----	145. 6
85 and over.....	295. 2	129. 0	238. 8	-----	-----	235. 7

¹ Rate for ages 10-19. ² Rate for ages 20-29. ³ Rate for ages 30-39. ⁴ Rate for ages 40-49. ⁵ Rate for ages 50-59. ⁶ Rate for ages 60-69. ⁷ Rate for ages 60 and over. ⁸ Rate for 70 and over.

SOURCE: Statistical Office of the United Nations, Demographic Yearbook, 1951.

By Causes of Death

The value of mortality data for specific diseases, such as those shown in table 3, in defining the disease problems of Latin America is limited by two factors. First, the proportion of registered deaths in many Latin American countries listed as due to ill-defined or unknown cause is comparatively large. For example, in the countries included in the table, the percentages of registered deaths recorded as due to ill-defined or unknown cause were 23.6 for Colombia, 15.2 for Peru, 6.0 for Costa Rica, and 21.0 for El Salvador; the percentage for the United States was 1.2. Second, medical certification applies to only a part of the registered deaths. In Colombia, 41.7 percent of registered deaths in 1947 were medically certified. In the same year, the percentage in Costa Rica was 59.0; in El Salvador, 16.7; in Mexico, 51.0; in Chile, 71.8; and in Uruguay, 97.7.

Despite these limitations, there is fair agreement among the specific disease rates for the

several countries. The highest mortality rates among the infectious diseases are usually for diarrhea and enteritis, followed by those for tuberculosis, malaria, and whooping cough, but with bronchitis and influenza frequently occupying important positions. It may be that some of the tuberculosis deaths are reported as bronchitis deaths, which would serve to magnify the importance of the latter.

Striking Differences

When the specific disease rates of these four Latin American countries are compared with those of the United States, the most striking differences are (a) the higher incidence of deaths due to the infectious diseases, especially those usually associated with infancy and early life; and (b) the lower incidence of deaths from cancer, heart disease, and nephritis, which are characteristic of the later years of life. A similar picture is presented in table 2, in that the favored mortality position of the younger age groups in the United States largely dis-

Table 3. Number of deaths and death rates per 100,000 population in five countries, by selected cause (stillbirths excluded)

Cause	United States 1948		Colombia 1948		Peru 1948		Costa Rica 1949		El Salvador 1948	
	Number of deaths	Death rate	Number of deaths	Death rate	Number of deaths	Death rate	Number of deaths	Death rate	Number of deaths	Death rate
All causes.....	1, 444, 337	989. 0	154, 392	1, 432. 6	83, 022	1, 074. 3	9, 884	1, 179. 4	30, 527	1, 454. 3
Typhoid and paratyphoid.....	233	. 2	1, 560	14. 5	854	11. 1	50	6. 0	82	3. 9
Whooping cough.....	1, 146	. 8	3, 856	35. 8	5, 970	77. 2	235	28. 0	751	35. 8
Diphtheria.....	634	. 4	485	4. 5	141	1. 8	61	7. 3	29	1. 4
Tuberculosis (all forms).....	43, 833	30. 0	4, 623	42. 9	6, 786	87. 8	439	52. 4	845	40. 2
Malaria.....	170	. 1	2, 929	27. 2	2, 002	25. 9	525	62. 6	2, 794	133. 1
Syphilis.....	11, 616	8. 0	655	6. 1	170	2. 2	51	6. 1	372	17. 7
Influenza.....	5, 068	3. 5	2, 067	19. 2	6, 468	83. 7	24	2. 9	344	16. 4
Smallpox.....	5	0	463	4. 3	1, 672	21. 6				
Measles.....	888	. 6	760	7. 1	1, 343	17. 4	21	2. 5	142	6. 8
Typhus fever.....	177	. 1	1, 537	14. 3	1, 392	18. 0	4	. 5	1	0
Diarrhea and enteritis.....	8, 831	6. 0	15, 470	143. 5	3, 964	51. 3	1, 594	190. 2	5, 872	279. 7
Other infectious or parasitic diseases.....	9, 178	6. 3	6, 792	63. 0	2, 304	29. 8	756	90. 2	1, 325	63. 1
Cancer.....	197, 042	134. 9	3, 462	32. 1	974	12. 6	492	58. 7	378	18. 0
Heart diseases.....	471, 469	322. 8	6, 733	62. 5	2, 867	37. 1	737	87. 9	363	17. 3
Nephritis.....	77, 377	53. 0	3, 827	35. 5			203	24. 2	254	12. 1
Bronchitis.....	3, 450	2. 4	7, 137	66. 2	2, 173	28. 1	418	49. 9	1, 437	68. 5
Ill-defined or unknown cause.....	18, 082	12. 4	36, 602	339. 6	12, 663	163. 9	593	70. 8	6, 423	306. 0

SOURCE: Statistical Office of the United Nations, Demographic Yearbook, 1951.

appears in the older age groups where the degenerative diseases begin to take their toll.

The young-age deaths that characterize the Latin American countries constitute a tremendous drain on the human resources of the region and are an economic handicap of first importance. The seriousness of the situation is mitigated only by the knowledge that these deaths are largely preventable.

As a result of the high mortality in Latin America, especially during infancy, life expectancy is well below that of Western Europe, Canada, and the United States. In Latin America it ranges from 35 years in Venezuela (1949) to 46 in Colombia (1947); in Canada and the United States, it is from 65 to 70 years.

Morbidity Rates

The damage inflicted upon a population by disease is measured more accurately by the number of illnesses produced than by the number of deaths that ensue. Typhoid fever, for example, results in death in about 10 percent of the cases, and this percentage is substantially lowered when appropriate treatment with chloromycetin is employed. Malaria, which ranks with tuberculosis as the world's most prevalent disease, produces death in a relatively small percentage of cases. A somewhat similar situation occurs with most of the infectious and parasitic diseases of man. It is clear, therefore, why the mortality record is quite inadequate to evaluate the burden occasioned by disease. The incapacitation and economic loss that result from illnesses are together the true measure of their importance to mankind.

It is well known that the reporting of illnesses in Latin America is incomplete. Even if a satisfactory reporting system could be devised, it could not operate in these countries since in none of them is there a sufficient number of physicians to attend all the sick. In many sections, notably the rural areas, there are no physicians at all. The most reliable statistics are to be found in the cities and towns where physicians are relatively numerous.

Some idea of the volume of illnesses in Latin America may be obtained from the data for Colombia shown in table 4. It can be estimated that there were at least 1,000,000 illnesses in this country in 1948, if the experience in the half of the population not represented by these data was similar to that shown. Taking into account the many illnesses unattended by a physician and the many that for one reason or another were not reported, the number was probably much greater. In the same year Colombia reported 154,392 deaths from all causes. The total picture of disease thus includes the morbidity as well as the mortality experience.

Table 4. Reported illnesses in Colombia, 1948

[209 of 815 municipalities reporting, representing about half of Colombia's population]

Illness	Number of cases	Rate per 100,000 population
Malaria.....	89, 727	1, 655
Influenza.....	75, 756	1, 398
Intestinal parasites.....	72, 421	1, 336
Hookworm infestation.....	40, 228	742
Amoebic dysentery.....	38, 395	708
Gonorrhea.....	29, 614	960
Syphilis.....	27, 158	501
Whooping cough.....	20, 057	859
Typhoid and paratyphoid.....	11, 207	207
Measles.....	11, 169	478
Scabies.....	10, 273	189
Tuberculosis of lungs.....	8, 667	160
Pneumonia.....	8, 599	158
Chancroid.....	7, 802	253
Smallpox.....	7, 356	71
Diarrhea and enteritis (under 2 years of age).....	6, 875	11, 699
Erysipelas.....	5, 255	97
Mycosis.....	3, 883	71
Typhus fever.....	3, 471	90
Pinta.....	3, 395	62
Relapsing fever.....	3, 085	57
Chickenpox.....	2, 954	54
Mumps.....	2, 790	51
Yaws.....	2, 357	43
Diphtheria.....	2, 238	96
Tuberculosis, other than respiratory.....	416	7
Bartonellosis.....	25	. 05
Undulant fever.....	4	. 07
Other illnesses.....	9, 441	-----
Total.....	504, 618	-----

SOURCE: J. W. Mountin, The Basis of a Development Program for Colombia. Washington, D. C., the International Bank for Reconstruction and Development, 1950.



Disease and Nutritional Barriers to Health

Clearly, ill health reduces manpower and retards economic progress. In these excerpts some of the specific disease problems of our southern neighbors are outlined, and some of the main lines of attack by the Servicios are traced. The "nutritional spectrum," heavily weighted on the side of malnourishment, is described, together with the efforts toward improvement.

EXAMINATION of mortality and morbidity data leads to the conclusion that malaria and tuberculosis were the outstanding disease problems in Latin America during the decade 1942-52. Such diseases as yaws, hookworm disease, Hansen's disease, schistosomiasis, and epidemic typhus, however, also constituted problems, and in some areas one or another of these rivaled malaria and tuberculosis for a top-ranking position.

In Haiti, for example, it is believed that yaws has attacked one-third of the population of 3,000,000 and that at any one time there are at least 50,000 active cases.

Hookworm disease was, and still is, a major problem in tropical and subtropical areas where climatic and soil conditions are favorable and where the disposal of human feces is improperly provided for. This disease represents a heavy burden on the productive capacity of the population.

There are more than 37,000 known cases of Hansen's disease in Brazil, 8,000 in Colombia, and about 8,000 in Mexico. Other countries have a few hundred to a few thousand cases each. Since there are no certain means of preventing or of curing this disease, it is still necessary to provide custodial care for thousands of infected individuals.

Schistosomiasis is limited to a few areas of Latin America, but the necessary intermediate host, a snail of the genus *Planorbis*, is widely

distributed in several of the countries. This disease represents a serious threat since as yet no wholly practical and effective means of control has been devised.

Epidemic typhus and murine, or endemic, typhus are prevalent in the Andean region particularly and may be found in other parts of Latin America. Fortunately, the means to control epidemics, and perhaps to prevent them as well, are available.

Other diseases found in Latin America include Chagas' disease, plague, bartonellosis, brucellosis, and onchocerciasis, as well as the more commonly known diseases, such as typhoid fever, the dysenteries, smallpox, diphtheria, measles, and whooping cough.

Though knowledge is far from complete in respect to the importance of specific diseases in infant mortality, it is generally accepted that a major portion of the infant deaths result from intestinal infections. The *Shigella* and *Salmonella* groups of bacteria and probably certain viruses which are as yet not clearly determined are the causal agents. Malnutrition, either alone or in conjunction with an infectious agent, is also assigned a significant role in infant deaths.

Chiefs of Field Party Analysis

A series of reports drafted by the chiefs of the United States field parties offered an op-

portunity to compare the conclusions reached by a study of official records with the impressions and opinions of competent resident observers.

In 1949, the chiefs of field party had been requested to furnish a list of the 10 diseases which were considered the most serious public health problems in the countries in which they were resident. Since the instructions did not specify the characteristics of a disease which permit it to be designated a public health problem nor provide criteria whereby importance might be measured, it was to be expected that the replies would lack uniformity and would include a wide range of disease entities.

A total of 35 different diseases were enumerated as major public health problems in the 13 lists returned. Of these only one disease, tuberculosis, appeared in all the lists. Syphilis and typhoid fever were each included in 12 lists, malaria in 11, and whooping cough in 10. No other disease approached such unanimity except measles, which was included in 8 lists.

Such intestinal diseases as diarrhea, enteritis, the dysenteries, typhoid fever, and paratyphoid fever considered as a group, as is justifiable on epidemiological grounds, were listed 25 times. Acute infectious diseases—whooping cough, measles, diphtheria, chickenpox, meningitis, and smallpox—were listed 31 times.

First priority was accorded tuberculosis on 7 lists and malaria on 3; the remaining 3 lists gave priority to whooping cough, yaws, and “diarrhea and enteritis under 2 years of age,” respectively.

The interesting feature of this analysis is not the diverse responses, but the agreement among the chiefs of party as to the diseases which deserve to rank as the first five. These were tuberculosis, syphilis, the enteric infections, malaria, and whooping cough, the very same infectious diseases commonly found to rank high in the morbidity and mortality records of Latin America. With the exception of tuberculosis, these diseases respond favorably to prophylactic and therapeutic measures commonly available, and none of them needs to remain a potent enemy to man. The various Latin American national health services have it within their power to reduce the prevalence of any or all of them to relatively small proportions.

Nutrition

Nutrition plays a determining role in the health of every individual, irrespective of race, age, sex, occupation, or place of residence. The well-nourished and the malnourished, including both the overnourished and the undernourished, form a complete nutritional spectrum of every population group. Studies made in Latin America indicate that the nutritional spectrum is heavily weighted on the side of malnourishment in large groups of the population, but until additional, extended studies have been made, no reliable estimate of its distribution is possible. From casual observation, it is assumed, however, that malnutrition is an important problem.

On the basis of spot surveys and laboratory studies, the National Institute of Nutrition of Colombia claims that poor nutrition affects a large portion of the population of that country. This was evidenced by altered height, weight, and body measurements of the people as well as by decreased work capacity and the presence of clinical findings. The diet of the Colombians was shown to be low in proteins, fats, vitamins, and essential minerals, and to be high in carbohydrates.

It is well known that hookworm disease, malaria, and tuberculosis are intimately related to malnutrition in many persons who suffer from these diseases, but whether or not the relationship is causal defies affirmation except in certain individual situations. The sufferer of malaria or hookworm disease may be malnourished because of the anemia that reduces his productive and earning capacity and therefore his ability to provide for his food needs. Or the malnourished person, as a result of diminished resistance, may fall an easy victim to such diseases. Whatever may be the relationship, it is clear that the well-being of the individual is compromised by malnutrition as well as by certain specific diseases.

By 1942, a number of the Latin American countries were already interested in nutrition. Uruguay created a Department of Nutrition and Dietetics in its Ministry of Health in 1934, and about the same time a National Commission for Nutrition was formed. Two years later Mexico established a Nutrition Re-

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tain records which would permit a fair evaluation of precisely what was accomplished. This was not done systematically.

Importance of Nutrition

Servicio directors appeared to be unanimous in their belief that malnutrition was widespread and of such intensity as to constitute a serious health hazard in many parts of Latin America, but relatively little was done to improve the situation. The *Servicios* invested only 2.9 percent of their funds in nutrition projects and developed programs in but 5 of the 18 countries. Much greater attention should be devoted to the problem of nutrition in the future than has been accorded it so far.

Infant Diarrheas

Another area which calls for greater concentration is the infant diarrheas. Advances have

been made in knowledge of their etiology and epidemiology but not enough to enable the health worker of Latin America to bring them speedily under control. It is believed that additional field studies should be undertaken and persisted in. The hope of reducing the infant mortality which results from the infant diarrheas rests in the first instance upon research.

Conclusion

The infectious diseases and malnutrition together make up the principal disease burden of the people of Latin America. These diseases are a principal factor in producing the short life span characteristic of the population. Moreover, ill health reduces manpower and retards economic progress. It is recognized, however, that these diseases are largely preventable. Intensified public health measures will assuredly conquer them.

From THE CHILD

Cerebral-Palsied Children

Believing that many cerebral-palsied children like other youngsters can be brought up in their own homes—New York City has developed four special units for educating them in the public schools. At the same time, the handicapped children receive the special medical and health services they need. These advantages are particularly important for the children's emotional growth and development. From the long-range view, the classes are helping the children attain partial independence and productivity. (See Cerebral-Palsied Children Attend Special Classes in Public Schools—Drs. Helen M. Wallace, Leona Baumgartner, and William Cooper in the August-September 1953 issue of *The Child*.)

A Manual for the Operation of Cerebral Palsy Units in New York City is available

upon request from the Bureau for Handicapped Children, New York City Department of Health, 125 Worth Street, New York 13, N. Y.

Rheumatic Fever Problems

Parents with children convalescing from rheumatic fever have been brought together to discuss common problems and fears. They meet with the staff of the pediatric cardiac clinic at the Grace-New Haven (Conn.) Community Hospital. (Jean Kiningham Igersheimer and Drs. Charles Henry Crothers and Robert B. Kugel describe this program in the August-September issue.)

The Child is issued 10 times a year by the Children's Bureau, U. S. Department of Health, Education, and Welfare. \$1.25 a year (\$1.50 foreign mailing), 15 cents a copy, from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.



Principles of Public Health Program Planning And Their Application in Latin America

Dividends are higher from any well-conceived operation, whether by business or government. Especially in public health undertakings, where outcomes are not easily measurable, is advance planning essential. Here the evaluators describe certain basic principles and the facts and figures necessary for complete program planning, and strike a balance from the record of inter-American cooperative programs.

THE PLANNING that had gone into 10 years of operation of the bilateral health programs of the Institute of Inter-American Affairs was examined and appraised on the basis of the following general considerations:

1. Program planning is one of the most important functions of management, whether the enterprise be in the field of business, government, or philanthropy.

2. Experience has shown that the benefits or dividends from operations vary directly with the quality of planning. Poorly conceived plans giving a minimum of benefit usually call for the expenditure of just as much effort and funds in their execution as do good ones.

3. A business enterprise is established primarily to make money, and when dividends de-

cline or cease, search is immediately made to determine what is wrong. No such automatic criterion exists to test the efficiency of social organizations such as government and philanthropy; therefore, management of these organizations calls for a very highly developed sense of responsibility and critical self-evaluation.

4. By definition, a program is a prearranged plan. Also by definition, a plan is an arrangement of means or steps for the attainment of some objective. Thus, if the objective is not clearly defined, the arrangement of appropriate means or steps to achieve it will be difficult, and the program will lack precision and completeness.

Institute Program Objectives

The program of the Institute of Inter-American Affairs had more precise objectives during its earlier years than in more recent ones. At the time of its establishment, the objectives were: (a) to improve health conditions in strategic areas, particularly with relation to the requirements of the Armed Forces of the United States and those of its American allies; (b) to carry out the obligations of the United States Government assumed by it under the resolution

This is the eighth in a series of excerpts from the Public Health Service's evaluation of a decade of operation of the Institute of Inter-American Affairs cooperative health programs. Background information on the evaluation survey and on the origin and structure of these programs can be found in the September 1953 issue of Public Health Reports, beginning on page 829.

regarding the health and sanitation problems of the Americas which had been adopted by the Third Meeting of Ministers of Foreign Affairs in Rio de Janeiro; (c) to make possible increased production of critical materials in areas where bad health conditions existed; and (d) to demonstrate by deeds as well as words the tangible benefits of democracy and to win active support of the civilian population.

The first three of these objectives were intimately related to the war effort, and the success in achievement could be measured objectively by the health records of the Armed Forces personnel stationed in the Latin American Republics and by the rate of production of critical materials. However, even though the primary aims were to meet an emergency need, there was a constant interest in long-range projects looking toward improvement of conditions in the hemisphere. Nonetheless, the program in the early years must be viewed as a part of the war effort and evaluated on that basis. A highly creditable level of achievement was attained during this period.

After the Second World War these objectives were replaced by others. In the Institute of Inter-American Affairs Act of 1947 (Public Law 369, 80th Cong.), which authorized the continuance of the Institute, it was stated that the purposes of the Institute should be "to further the general welfare of, and to strengthen friendship and understanding among, the peoples of the American Republics through collaboration with other governments and governmental agencies of the American Republics in planning, initiating, assisting, financing, administering and executing technical programs and projects, especially in the fields of public health, sanitation, agriculture and education."

In line with this directive the Institute declared that the broad, basic objective of its postwar program would be to raise the level of living of the people in the several American Republics, and it viewed this objective as within the framework of a larger one—peace and prosperity in the Western Hemisphere.

Thus, postwar objectives were general, and evaluation of success in attaining them was therefore more difficult. The task was further complicated by the fact that many forces were at work, striving to achieve the very same ob-

jectives. Since the survey was concerned with only one part of the Institute program—health and sanitation—the following criteria were established for measuring success: (a) the extent to which the indigenous health organizations were being developed and stabilized; (b) the rate at which programs and methods were being incorporated into the permanent public health structure; and (c) the extent to which health habits and practices of the people were being influenced.

Responsibility for Planning

The program in each country had to be directed toward the achievement of the broad objectives set forth in the basic agreements between the United States Government and the government of the host country. The responsibility for preparing a detailed plan of operation was shared by the minister of the unit of the host government in which the *Servicio* was established and the chief of the United States field party, who was usually also the director of the *Servicio*.

Program planning ranged from excellent to mediocre. There appeared to be a direct correlation between excellence of planning and the number of years a *Servicio* director had been in a given assignment. In several countries it was observed that the program had changed with each new chief of field party; therefore, the value that might be expected from prolonged intensive efforts was dissipated. Often planning was lost sight of in the pressure of discharging operational responsibilities.

In one country the program during the initial period resulted from dictation rather than joint planning. Instead of the appropriate type of program being determined on the basis of a study of the country's needs, it was determined ex cathedra by the minister and other high government officials. Ten new hospitals were built and 17 existing ones received substantial additions to their facilities. At the time of the field survey in late 1951, 3 of these new hospitals were still not in use. This was an example of poor planning, or more accurately, of no planning.

Foundation of Good Planning

A knowledge of certain basic facts concerning a country and its people is considered nec-

essary for sound program planning. Characteristics of the population, vital statistics, health institutions, health personnel, governmental structure, voluntary health agencies, social institutions and customs, economic status, and geography and climate are among the areas in which data should be obtained.

An increasingly active interest in program planning was found during the field survey in Latin America. Where the basic facts were incomplete and inadequate, steps were being taken to supplement them. It is recognized, of course, that the collection of basic data is a long and laborious task and that certain of the data will have to be kept current. Rarely will the director of the *Servicio* be able to accomplish the task by himself. The talents of all field party members and of many members of the national health service will have to be enlisted. A continuing responsibility for collecting and assembling basic data might well reside in a special committee appointed by the director of the *Servicio*.

Population Characteristics

The geographic distribution of the people is likely to have a direct bearing on the type of disease burden and the ease with which the people can be reached in a program for health betterment. If the population is predominantly rural, the problem of establishing contact between the people and the health service will tax the administrator's ingenuity, and this problem will be even greater if the rural population lives on scattered farms rather than in villages.

The age level of the population will indicate whether the program should be directed primarily toward the health hazards of infancy, youth, and early adult life or toward the diseases that characterize old age.

The principal occupations should be known since certain occupations have intrinsic health hazards. The lumberjack in the endemic areas of jungle yellow fever, for example, is in special danger of contracting the disease. Among certain types of miners, silicosis may be a hazard. The factory worker from rural areas appears to be especially susceptible to tuberculosis.

Racial composition of the population should

be determined since susceptibility and resistance to certain diseases are known to be in some way related to race.

Knowledge concerning literacy will have value in determining the most effective means of communication. The techniques used in health education, for example, will have to be adjusted accordingly.

Vital Statistics

An accurate census is essential in every field of social endeavor. It not only provides the information required to establish the characteristics of the population, but it permits calculation of rates and establishment of baselines which are necessary in measuring the effectiveness of health programs.

The number of births, deaths, marriages, and divorces by age and sex where appropriate and by political subdivision should be known. An effort must be made to determine the nature of the mechanism established for the collection of vital statistics and the precision with which it functions; otherwise, it will be impossible to judge the reliability of the statistics or to determine how they may be improved.

The causes of death and, if obtainable, the causes of illness, will help identify the principal diseases of a population. Frequently, the incidence of a disease in an area, or in an entire country, is unknown, and just as frequently no mechanism for ascertaining the facts exists. In such circumstances, a sampling survey may have to be undertaken. The prevalence of hookworm infestation, for example, was not appreciated in many Latin American countries 30 years ago. Surveys revealed that hookworm infestation affected up to 100 percent of the population and that actual disease occurred in from 10 percent to 50 percent or more.

Information as to the average family income should serve as an ever-present warning to avoid activities that call for expenditures by householders beyond their financial competence.

Health Institutions

The majority of health institutions are concerned with the prevention, diagnosis, and treatment of disease. They include the health departments with their health centers, specialized clinics, and other preventive services; the

laboratories for the control of water, milk, and other food products, and the diagnosis of morbid conditions; and hospitals of all types.

Another smaller group of institutions whose importance cannot be overestimated is the research group. These institutions determine in large measure the rapidity with which advances may be achieved in medical care, both preventive and curative. Often, of course, the institutions primarily concerned with the application of medical knowledge, such as hospitals, diagnostic laboratories, and health departments, also engage in research. Their investigations are as likely to be focused on administrative practices and organization as on medical knowledge per se.

A complete list of these several institutions is necessary to determine whether or not they are readily accessible to the population and to what extent they are capable of meeting the needs of the country.

Health Personnel

The number and distribution of medical and health personnel serving a population and the nature and capacity of institutions for training such personnel should be determined as accurately as possible. The number of physicians, engineers, dentists, dental hygienists, hospital administrators, nurses, nurse's aides, social workers, sanitarians, dietitians, and other specialized workers will indicate where expansion of training institutions is most needed. The extent to which such personnel is concentrated in urban areas, especially when the rural population carries the principal disease burden, must also be known. Some estimate as to the quality as well as the quantity of workers in the health and medical fields is highly desirable, though obviously more difficult to determine.

Governmental Structure

The organization and the functions of each part of the host government having a responsibility in the health field should be recorded.

Though the ministry of health in Latin American countries usually carries the major obligation for health services, the ministry of social welfare and the ministry of social security,

where these exist, frequently administer a part, if not all, of the hospitals and custodial institutions of a country. The ministry of education frequently has the obligation to maintain school health services and to this extent also shares in the administration of the nation's health services. This ministry's major responsibility in the health field, however, usually concerns the preparation of medical and health personnel. The ministry of public works is likewise tied in closely with the health field in view of its role in the construction, and often design, of hospitals, health centers, water supplies, and sewage treatment plants.

Voluntary Agencies

A careful analysis of the programs conducted by voluntary health agencies should be made so that due weight may be given them in planning the national health programs. The Red Cross, for example, frequently operates schools of nursing and health centers. In a number of countries a large part of the campaigns against tuberculosis and the venereal diseases is carried on by voluntary organizations.

Social Institutions and Customs

Social institutions, customs, and cultural traits are less easily identified and understood than the infectious diseases, for example, but they are equally important, if not more so, in planning health programs. The health planner needs to be familiar with the current beliefs of folk medicine and the attitudes of people toward modern scientific medicine. He must have an understanding of the habits of the people, the motivations of individuals, and their goals in life. Land tenure laws, social legislation, and housing are also important subjects in this field.

Economics

The economic potentialities of a country, as well as its present status, must be understood as a basis for realistic planning and as a means of protection against undertakings which are beyond the national resources. The level of productivity, the nature of the labor market, the trend towards industrialization, the national income, and the tax system are additional matters requiring investigation.

The fields of health, education, agriculture, and industry are interrelated and interdependent. If the level of living of a people is to be raised, no one of them may be ignored. The planner in the health field must therefore understand the problems of education, agriculture, and industry and, whenever possible, should seek ways and means whereby the health program will aid and reinforce programs in these fields and should attempt to utilize related programs to aid the health programs.

Geography and Climate

The geographic and climatic characteristics of a country have a direct relationship to many of its health problems. Not only physical factors, such as altitude, latitude, soil, insolation, temperature range, humidity, and rainfall, but many biological factors as well, are involved. The fauna and flora also determine in no small measure the health hazards of an area.

Formulation of a Program

The next step in program planning is to determine from a study of such basic data what the outstanding problems of the country are and which ones are susceptible of solution. It is at this stage of planning that the experience and judgment of the minister and the chief of field party are of crucial importance. They and their advisers must assign priority values to the several problems calling for solution. Program formulation may then proceed.

Depending upon circumstances, the program objective may be attained by a single project, such as the installation of a water supply system, or by a series of projects, such as those aimed at the control of tuberculosis. In the latter case, one project of the series might be an epidemiological study of tuberculosis to determine its incidence rate, the principal avenues of dissemination, or the role that BCG vaccination might be expected to play. Another project might be a case-finding campaign. Still another could be the establishment of a tuberculosis hospital.

Though projects will differ widely in their aims and provisions, they should resemble one

another in their formulation. The project agreement drawn up by the chief of field party and the minister should provide the following information: (a) the nature of the problem and objective of the project; (b) any previous projects which are similar; (c) a complete description of the project, including the location, the reasons for selection of the project, and the manner in which it is to be developed; (d) a clearly defined plan of administration; (e) the proposed time schedule; (f) arrangements for the transfer of the project to the national health service; (g) an estimate of the amount of money to be spent; and (h) the sources of funds.

The project agreement should be so complete and well documented that a new chief of field party or a new minister would have no difficulty in understanding the project or in discharging his responsibilities for its successful completion. The goal which the project aims to achieve should be precise and limited so that the accomplishment may be measured objectively.

Evaluation of Program Planning

In general, project agreements were found to be well prepared. The principal shortcomings were (a) the frequent omission of terminal dates, despite the fact that provision usually existed for an extension of the date if it were required; and (b) the absence of arrangements for the orderly transfer of responsibility for the project from the *Servicio* to the appropriate government agency.

Planning for Transfer

Chiefs of field party were sometimes reluctant to relinquish responsibility for completed projects for reasons that seemed unconvincing. For example, fear was expressed that a project when transferred to the host government would not be maintained at the same level of efficiency as under *Servicio* administration. If this fear were supported by facts showing, for example, a lack of funds or personnel to carry on the project, it could only mean faulty planning. Such prejudgments were regarded as neither persuasive nor trustworthy. The better procedure would have been to try out the new administrative auspices. If failure ensued,

then the reasons for failure could be identified and appropriate corrections applied.

In one instance, the director of the *Servicio* declared a certain health center, which had been in operation long enough to be considered an accepted method for providing preventive medical services, to be indispensable to him as a training center for *Servicio* personnel. In this particular country, the ministry of health had a section in its organization charged with responsibility for the training of personnel, which could have been used to meet the *Servicio's* needs.

An example of inadequate planning for the final transfer of a project to the constituted health authorities of the cooperating countries was found in one country. Although at the time of the survey, *Servicio* operations were in the hands of Latin Americans, difficulties had been encountered in transferring completed projects to the national health department. What had not been done, or could not be done, was to transfer with completed projects the privileges and immunities enjoyed by the *Servicio* but denied to the national health department. By virtue of the basic agreement between the ministry of health and the Institute, the *Servicio* had relative freedom to hire and fire personnel and was exempt from many bureaucratic controls on administration and utilization of funds. The national health department, recognizing its inability to equal the effectiveness of the *Servicio*, had therefore been reluctant to assume responsibility for certain of the major health and sanitation projects. A *Servicio* responsibility for many years, these services should be relinquished; yet, it appears that for the present the *Servicio* will be required to continue their operation.

Conclusions

The indigenous health organizations in Latin America usually, but not invariably, have been developed and stabilized as a result of the *Servicio* projects. More attention to planning might well have mitigated some shortcomings, however.

The rate at which programs and methods were incorporated into the permanent public health structure has been generally satisfac-

tory, although incomplete planning sometimes has retarded the process.

Although the extent to which health habits and practices of the people have been influenced is difficult to evaluate precisely, many of the situations studied indicate that the people's habits and practices were, in fact, favorably influenced.

National Advisory Health Councils

A survey of health program planning cannot be limited to planning done by the *Servicios* since health programs in Latin America are for the most part formulated and executed by the constituted health authorities of the national, state, and local governments. In some countries private agencies play a major role in health activities. In almost all the countries, the Red Cross conducts a health program that supplements that of the government.

In certain countries the entire campaign against tuberculosis is the responsibility of a private or voluntary agency. Notable in this regard is the *Liga Ecuatoriana Anti-Tuberculosis* which maintains in various parts of the country 23 dispensaries and 8 hospitals with a total of 2,000 beds. Not infrequently the hospitals, or a large portion of them, are operated by a voluntary organization termed *Beneficencia*. These voluntary agencies are usually subsidized by government, and in addition they benefit from lotteries or special taxes authorized by government.

Because the ultimate responsibility for all health programs rests essentially with the government, considerable advantage could result from joint planning. Moreover, since the success of health programs, whether official or voluntary, depends to a considerable extent upon an alert and informed public, it would appear desirable for the public to be brought into a relationship with the official planners.

A mechanism to secure both the benefits of coordination and of broad public support of health programs would be a national health council, advisory in character. Such a council could be created by the ministry of health. Membership should include representatives from all the national agencies concerned with health, the voluntary organizations, the uni-

versities, and the technical schools, as well as persons from philanthropy, business, finance, and industry. The council's membership would thus represent a cross section of society of the nation and would embrace the planners, providers, and consumers of health programs.

The advisory character of the council should be maintained. It should have no executive, financial, or administrative responsibilities. However, because of its composition, its advice should carry great prestige. Health plans of government might thereby be greatly strengthened.

In countries where governments may on occasion change suddenly, a national advisory health council would have the added value of providing a link between the old and the new, giving greater continuity to health activities, especially planning.

National and International Conferences

A number of agencies in addition to the Institute of Inter-American Affairs are engaged in cooperative health programs with many of the governments of the American Republics. Important ones are the Pan American Sanitary Bureau, which serves as the regional office of the World Health Organization; the United Nations Children's Fund; the Kellogg Foundation; and the Rockefeller Foundation.

The interests of these several agencies are not so very different, one from the other, and their cooperative programs in the American Republics are in consequence closely related. In Chile, three of these agencies—the Kellogg Foundation, the Rockefeller Foundation, and the Institute of Inter-American Affairs—cooperated with the government in the development of nursing education and medical education. The latter two agencies worked with the government in establishing the National School of Public Health in Santiago.

The National School of Nursing of the Central University in Quito, Ecuador, is another example of joint action. The PASB, the IIAA and the Rockefeller Foundation joined forces in aiding the Ministry of Health in the development of this institution. Aid included the provision of two American nurses to help with

organization and guidance in the early years, the reconstruction of a building to house the school, the purchase of equipment, some assistance in the initial cost of operation, and provision for a consultation service.

In almost every Latin American country examples could be cited of participation by more than one of these agencies in the national health program. The fact that so little real overlap and duplication of program activities was observed is a tribute to those responsible locally. However, it must be recognized that there is a degree of competition among the agencies to secure cooperative projects and funds to finance them, with the consequent danger of adverse effect upon the national health budget.

It would be a part of good planning for these cooperating health agencies and the several national health services to adopt some device for protection against possible adverse effects from uncoordinated program developments. More important would be the positive benefits that could accrue from the application of the joint resources in technical skills and funds toward a common objective. To this end, it is suggested that clearinghouse conferences be established at both the international and national levels. At these conferences an opportunity would be provided each agency to describe its program interests and its plans for project development. Opportunities, if any, for joint action would become apparent.

A beginning at the international level has already been made in Washington, under the chairmanship of the director of WHO-PASB. Monthly meetings are being held with representatives from PASB, the IIAA, the Division of International Health of the Public Health Service, and other agencies. These have already proved useful.

A similar arrangement seems desirable for each American Republic where more than one foreign agency is cooperating. Since all international health agencies enter into bilateral agreements with the various governments in developing programs, the leadership in establishing clearinghouse conferences at the national level should be taken by the health authorities of each country.

technical publications

Fifty-first Annual Conference of the Surgeon General, Public Health Service, Chief, Children's Bureau, With State and Territorial Health Officers

Public Health Service Publication No. 307. 1953. 75 pages. Available on request to the Division of State Grants, Public Health Service, Washington 25, D. C.

The fifty-first annual conference of the Surgeon General, Public Health Service, and chief, Children's Bureau with the State and Territorial health officers, State mental health authorities, and representatives of State hospital survey and construction agencies was held December 8-11, 1952, in Washington. This publication constitutes the proceedings of the conference and includes the complete text of addresses given in the general sessions and the recommendations of the committees on environmental sanitation, Federal relations, hospitals, infectious diseases, maternal and child health, mental health, and special health and medical services. [Highlights of major addresses were published in *Public Health Reports*, February 1953, pp. 174-190.]

Health Manpower Source Book

Section 2. Nursing Personnel

Public Health Service Publication No. 263. 1953. Prepared by Helen G. Tibbetts and Eugene Levine. 88 pages; tables. 40 cents.

The second in a series of comprehensive source books on health manpower, this publication covers 50 years of nursing and contains 56 tables of data on nursing personnel, each preceded by a discussion of the background and methods used to gather the data.

The first part of the book deals with the general distribution of professional nurses; their age, sex, and marital status; licensure; and education. The second part presents data on the licensure and training of practical nurses. The last part of the book, fields of practice, gives comparative data for six fields of nursing and details on public health, industrial, and hospital nursing personnel.

A summary of trends is given at the beginning of the book. As of 1950 there were 249 active graduate nurses per 100,000 population in the United States. In 1910 the ratio was 55 per 100,000. In 1920 active graduate nurses were fewer than physicians; since 1930 they have outnumbered physicians. Since 1900 the proportion of men among active graduate and student professional nurses has declined from 6 percent to 2 percent, although their number has increased from 758 in 1900 to 11,329 in 1950.

Home Accident Prevention A Guide for Health Workers

Public Health Service Publication No. 261. 1953. 75 pages. 30 cents.

Accepting the thesis that the majority of home accidents can be prevented, this booklet presents an outline and guide to enable health workers to study and understand the chief causes of accidents in the home and to take measures that may prevent them. The material is prepared for the professional health worker on the premise that leadership in home accident prevention program development should be assumed by this group.

The problem of home accident prevention is defined in relation to other health needs. Factors, environmental and human, tending to cause accidents and their interrelationships are outlined. Suggested activities by agency, group, or individual for better understanding and treatment of

the problem are presented throughout the guide.

A 20-page list of selected references, coded to designate the various classifications of the content material, and a 2-page list of films and filmstrips are included.

Six Food Exchange Lists for Variety in Meal Planning

Public Health Service Publication No. 326. 1953. 4-fold leaflet. Available on request to Division of Chronic Disease and Tuberculosis, Public Health Service, Washington 25, D. C.

Selection of a varied diet, especially for the diabetic person, is made easier by the use of the six food exchange lists developed by committees of the American Diabetes Association and the American Dietetic Association, in cooperation with the Public Health Service. The leaflet sets forth six lists of food items—milk, vegetables, fruits, bread, meat, and fat. All foods within the same list contain approximately equal amounts of carbohydrate, protein, fat, and calories, and thus one food in a list may be substituted for another food on the same list. For example, on list 4 one small potato may be used in place of a slice of bread.

This leaflet does not give a diet prescription. A physician should prescribe the amounts of food and the number of exchanges allowed each day. The food exchange lists facilitate selection of a variety of foods for a diet that is being followed.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

Training Courses in Prothrombin Time Determinations

Clinical research during the past decade has shown that the proper use of anticoagulant drugs can reduce morbidity and mortality from thrombosis and embolism. Safe and effective use of these anticoagulants, however, requires a more complete laboratory control than is necessary for most drugs, since their safe administration depends upon reliable laboratory data for control of the dosage.

Refresher courses in this technique are offered by the heart section, Division of Chronic Disease and Tuberculosis, Public Health Service, with the sponsorship and/or cooperation of the various State health departments, American Heart Association, pathology societies, and other interested organizations. The purpose is to present to medical technicians the critique of performing accurate, reproducible prothrombin time determinations, and to afford an opportunity for supervised laboratory experience with these methods.

Services and materials available through the regional offices of the Department of Health, Education, and Welfare include a brief description of the course; services of a physician-director and a technician-instructor in planning and conducting the training course; a teaching manual; and laboratory manuals for participants.

Since the pilot technician-training program began in Massachusetts in 1950, refresher courses have been provided in 12 States and 1 Territory (see table). In at least 9 other States, technician-training is now being provided on a long-range basis by local institutions.

State	Number technicians trained	Number laboratories or hospitals represented	State	Number technicians trained	Number laboratories or hospitals represented
Arkansas.....	22	16	North Carolina....	47	38
Florida.....	88	64	South Carolina....	14	11
Idaho.....	6	5	Tennessee.....	10	8
Kansas.....	28	26	Utah.....	23	13
Maryland.....	1	1	Puerto Rico.....	15	11
Massachusetts.....	71	55			
Montana.....	15	9			
New Jersey.....	26	22	Total.....	366	279

NOTE: At the time this table was prepared, a series of courses was being given in Virginia to about 18 technicians.

The Occurrence of Influenza In the United States, 1952-53

By DORLAND J. DAVIS, M.D., and CARL C. DAUER, M.D.

UNDER THE SPONSORSHIP of the World Health Organization, a worldwide effort to improve the reporting and epidemiological study of influenza and the exchange of virus strains has been in effect for the last 6 years.

In the United States the WHO Influenza Study Program has been ably supported by investigators and diagnostic laboratories of State and Federal agencies, universities, the Department of Defense, and those associated with the Commission on Influenza of the Armed Forces Epidemiological Board. A previous report described the organization and specific objectives of the program and listed the participating laboratories (1). The present report will summarize the information obtained by these investigators and the mortality experience as reported by State and city health officers for the period from July 1, 1952, to June 30, 1953.

Dr. Davis is executive secretary of the Influenza Information Center, WHO Influenza Study Program in the United States, National Institutes of Health, Public Health Service. He is also chief of the influenza unit in the laboratory of infectious diseases, National Microbiological Institute of the Public Health Service.

Dr. Dauer is medical adviser to the chief of the National Office of Vital Statistics, Public Health Service.

Investigations of recent years have shown that there has been a progressive change in the antigenic pattern of strains of influenza virus, and attempts have been made to indicate this change in the designations of types, such as the widely used term influenza A'. These designations have been convenient but not completely satisfactory. The WHO Expert Committee on Influenza (2) recommends:

the subdivision of the influenza A virus into the following main groups, which are named after their prototype viruses and the date of their isolation:

WS (1933)

PR8 (1934)

FM1 (1947)

The recent A strains, of which FW/1/50 and A/England/1/51 are examples, though different from FM1, are not as divergent as the other main groups and are therefore considered to fall within the FM1 (1947) group. There is also a heterogeneous group of swine influenza viruses related antigenically to the human influenza A viruses.

The influenza B viruses should be subdivided into groups with the general characteristics of:

Lee (1940)

Bon (1943)

The most recent influenza B strains (1952) appear to diverge from Bon, and it may be found on the basis of future experience that further groups must be created.

In influenza C only one antigenic group is so far known, of which 1233 (1947) is the prototype.

Thus, the strains recovered during the 1952-53 season and referred to as A' because of their similarity to the FW/1/50 of FM1 strains,

which were used most widely for diagnosis, will be designated as belonging to the group FM1 (1947) in this report. Final studies may justify the designation of the 1953 strains as a separate group, but the recommendations of the WHO expert committee will be followed in the present report. Since various influenza strains were used as antigens for the hemagglutination inhibition and complement fixation tests by the different collaborating laboratories, results of serologic diagnoses will be recorded in tables 1 and 2 as either type A or type B with no attempt to differentiate further between strains.

Occurrence of the Disease

No outbreaks of influenza were reported within the United States during the summer and fall of 1952. There were, however, a few cases diagnosed serologically as influenza B and a few cases diagnosed as influenza A (FM1 (1947)) during October and November in military installations in the United States. A small outbreak of influenza-like disease occurred during the latter part of November at a military installation in the Philippine Islands, and several of the cases were subsequently specifically diagnosed as influenza A (FM1 (1947)).

In early December 1952, a definite increase in the incidence of acute respiratory disease occurred among military personnel at Fort Leonard Wood, Mo. The number of cases increased sharply and had reached a relatively high incidence by the last week of December. At this time an influenza A virus closely related to A/FW/1/50 was recovered from a significant number of cases, and serologic studies gave further evidence of influenza infection. However, not all cases studied were established as influenza, and the possibility of the concurrent presence of another disease was studied by military investigators.

During the same week in December, State health officials reported an influenza-like disease in Pueblo, Colo., and in nearby cities. This also was subsequently confirmed by laboratory tests as influenza A (FM1 (1947)). In Watauga County, N. C., a sharp epidemic with a high incidence rate was reported during the same week and shown to be influenza of the same type. Reports from the military services

indicated an increased number of cases of influenza in the Far East in late November and December, principally in Okinawa and Japan.

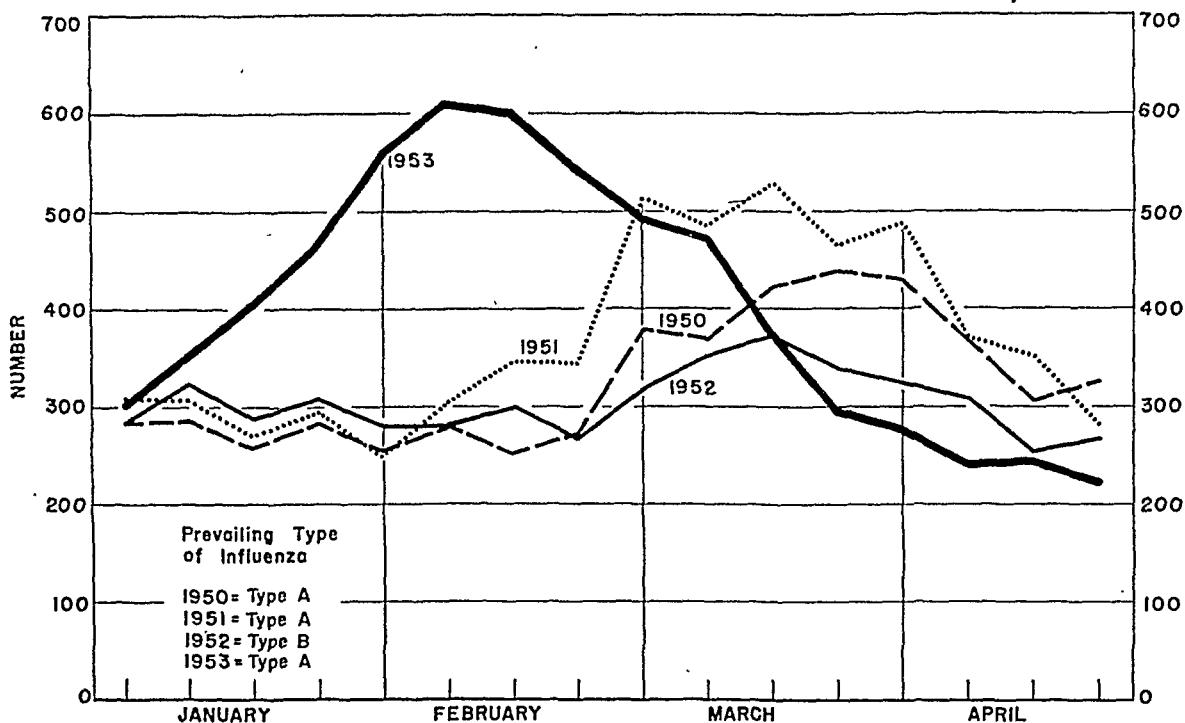
January 1953 Epidemic

During the first week of January 1953, influenza occurred in epidemic form in Iowa, Indiana, South Dakota, Oklahoma, Missouri, and Florida. By the second and third weeks of the month the outbreaks were reported from most of the middle western and southern States. Texas was particularly affected, and a large number of cases was reported. Subsequent reports indicate that influenza virus A (FM1 (1947)) was frequently recovered. The southeastern part of the United States also was affected, and the disease was specifically diagnosed in the Washington, D. C., area, Norfolk, Va., and other parts of Virginia. The northeast and New England area had a few localized outbreaks particularly noticeable in military installations, but the incidence generally was not high. On the west coast, the incidence was slightly increased but did not approach that of the midwest. Sharp outbreaks in the military and civilian population in Alaska began the first week of January and persisted throughout the month. Toward the end of January the incidence of disease in affected military installations fell off although in civilian populations incidence remained high, and new areas within the midwest and south reported outbreaks. In many of these areas schools were closed because of the illness among pupils and teachers. By the end of the month, the incidence was declining in most areas.

In the early part of February 1953, the incidence continued to decline, and during the remainder of February and early in March, a few scattered outbreaks of influenza occurred, particularly in schools and institutions, not only in the midwest and the south but also in the northeast and the west. No outbreaks have been reported in the United States since that time.

The total number of isolations of influenza virus and positive serologic tests reported from all participating laboratories in the continental United States and the Territory of Alaska by date of onset or collection for each month are presented in table 1. In addition, 16 strains of

Deaths From Influenza and Pneumonia for 58 Selected Cities; by Weeks



influenza A were recovered and 355 positive serologic tests for influenza A were made for which the month of onset or collection date was not exactly known although presumably it was during the period of highest incidence. Not shown in the table is a record of a case of influenza C diagnosed by the complement fixation test which occurred in Chicago during December 1952.

These data indicate that influenza A (FM1 (1947)) was almost exclusively the cause of the epidemic and that only a few sporadic influenza B infections occurred. That January was the month of highest incidence of specifically diagnosed cases conforms to the reports of the occurrence of outbreak received from health officers.

Dr. Clayton G. Loosli of the collaborating laboratory at the University of Chicago has submitted the following observations on the clinical features of the disease:

Although generally reported as mild, influenza infections produced in some cases severe prostration. They were sudden in onset beginning with high fever, marked headache, malaise, muscle aches and pains, and

dry cough. Some had photophobia. A few having etiological or serologic evidence of influenza also had symptoms of the common cold, sinusitis or a pneumonitis. Three cases with typical findings of pneumococcal pneumonia due to pneumococcus types I, II or III also had etiological or serologic evidence of influenza. The average hospital stay of uncomplicated influenza was approximately 5 days.

Mortality From Influenza

As shown in the accompanying chart, the number of deaths from influenza and pneumonia in 58 selected cities, which are located in all parts of the United States, began to increase early in January 1953. These diagnoses are based on records of death certificates and do not represent laboratory confirmed cases of influenza. The peak was reached in early February; after that time the number gradually declined. In the 3 years immediately preceding 1953, an increase in deaths from influenza and pneumonia did not begin until late in February, and in none of these years was the number reported as great as it was in 1953.

Data from 8 of the 58 cities were obtained on

Table 1. Isolations of influenza virus and positive serologic tests (any technique) reported by civilian and military laboratories participating in the United States and Alaska

Month and year	Isolation of virus		Positive serologic tests	
	A	B	A	B
December 1952.....	10	-----	29	4
January 1953.....	237	1	1, 148	22
February 1953.....	105	-----	1, 059	9
March 1953.....	27	-----	377	1
April 1953.....	-----	-----	69	3
May 1953.....	-----	-----	21	-----
Total.....	379	1	2, 703	39

numbers of deaths from influenza and pneumonia during January and February 1953 for broad age groups. The deaths from influenza and pneumonia combined showed the following distribution: 22.7 percent were in persons under 15 years; 1.3 percent were in the 15- to 24-year group; 28.4 percent in the 25- to 64-year group; and 47.5 percent were 65 years and over. The percentage distribution of influenza deaths was 7.7, 2.3, 20.9, and 69.0, respectively, for the above

Table 2. Estimated death rates per 100,000 population for the United States from all causes, and from influenza, pneumonia, and major cardiovascular-renal diseases, for certain months of 1951, 1952, and 1953

Month and year	All causes	Influenza	Pneumonia	Cardiovascular-renal diseases
December 1952.....	1, 014. 2	3. 4	31. 4	547. 5
January 1953.....	1, 083. 1	17. 1	48. 4	590. 7
February 1953.....	1, 131. 6	26. 4	49. 5	610. 7
March 1953.....	1, 021. 2	13. 6	34. 0	561. 7
April 1953.....	955. 7	5. 0	26. 0	524. 2
December 1951.....	1, 027. 2	3. 1	31. 0	551. 7
January 1952.....	1, 003. 5	4. 6	36. 6	544. 3
February 1952.....	1, 015. 6	8. 4	34. 7	538. 0
March 1952.....	1, 059. 5	12. 3	41. 0	568. 4
April 1952.....	982. 4	5. 4	31. 5	530. 5

age groups. These data indicate that persons in the older age groups felt the impact of the influenza epidemic more than younger persons.

The figures in table 2 have been taken from the *Monthly Vital Statistics Reports* of the National Office of Vital Statistics, Public Health Service. They show the estimated death rates for the United States from all causes; and from influenza, pneumonia, and major cardiovascular-renal diseases, based on a 10-percent sample; and they cover the periods when influenza was prevalent in 1952 and 1953. Although these data are subject to random sampling errors, they show that the number of deaths from all causes and from pneumonia and cardiovascular-renal diseases increased moderately and that those from influenza increased markedly during the period when influenza was known to be prevalent. The increases were greater in 1953 than in 1952; this is consistent with the data for 58 cities shown on page 1143.

Antigenic Analysis of 1953 Strains

The WHO Strain Study Center for the Americas, located in the laboratory of Dr. T. P. Magill, State University Medical Center at New York, Brooklyn, N. Y., has studied the antigenic characteristics of 24 strains of influenza virus isolated late in 1952 and in 1953 by various workers. Hemagglutination inhibition tests were performed with these strains and cholera-filtrate treated rabbit antisera which were prepared against 8 chronologically separated strains:

A/PR8/34.	A/FW/1/50.
A/New York/41	A/England/1/51.
(Coyle).	A/New York/1/53.
A/FM1/47.	A/Ohio/1/53.
A/Nederland/1/49.	

These tests showed clearly that the recently isolated strains were influenza A virus but were different antigenically from previously isolated ones. The 1952-53 strains possessed some antigenic components which were undetectable or inconspicuous in the older strains. They differed in practically the same degree from A/FM1/47, the prototype of the A' strains, as the latter differs from the PR8 strain in 1934. This adds further evidence to the concept of an apparently orderly alteration in the antigenic

The Virus, the Cell, and the Potentialities of Influenza

"I have spoken throughout as if influenza virus were no more than a laboratory tool, a subtle probe with which to explore the finer structure and functioning of the living cell. It would not be fitting, however, to end this lecture without reminding you that influenza virus is also an important agent of disease. It is a virus which even in 1951 killed heavily amongst the old people of Europe and in 1918-19 generated the third great plague of recorded history. Of all virus diseases influenza is probably that in which mutational changes in the virus are of greatest human importance. We can only guess what type of virus was responsible in 1918-19 and what changes took place during the course of the pandemic. But even in the period since the human virus was first isolated in 1933 there have been striking changes in the immunological character of both influenza A and B viruses. Some of us believe that the influenza virus' chief means of survival

is its capacity for constant mutation to new serological patterns, and those of us who have had anything to do with the production of influenza vaccines know very well how that capacity can nullify the most painstaking work. Infectious disease today has lost most of its terrors, and in America at least the peaks of mortality that always marks the passage of an influenza epidemic are becoming smaller. But no one yet can say whether or when we shall see another pandemic outbreak of influenza. Until we know the answer to that question we should not be too complacent about our powers to deal with acute infectious disease. Even the most academic-seeming of investigations, like those I have described, may one day become matters of life and death."

—Sir F. MACFARLANE BURNET, F. R. S.,
in the Second R. E. Dyer Lecture, 1952,
Public Health Service Publication No. 328.

composition of influenza viruses by the appearance or dominance of new components and the suppression or disappearance of others as determined by this method of analysis.

Influenza Outside the United States

From outbreaks of influenza in South Africa during June 1952 and on Bahrein Island during September, strains of influenza A (FM1 (1947)) were isolated and identified by the laboratories cooperating in the World Health Organization study. Influenza was next reported in the Far East, Japan, and the Philippine Islands in early December 1952. Approximately coincident with highest occurrence of the disease in the United States during January 1953, outbreaks appeared in France, Germany, and southern England, later extending to the Scandinavian countries, Switzerland, and Austria, and to scattered parts of Europe. The isolated strains were all influenza A (FM1 (1947)), similar to those isolated in 1951 and to those

recovered in the United States during January 1953.

Later in 1953, during May, June, and July, influenza appeared in the Central American and South American countries in large outbreaks, but virus strains have not yet been completely studied. Mortality reports indicate that the death rates in European and South American countries were similar to those in the United States with some increase in the death rate from influenza and pneumonia, but the increase was largely confined to the older age groups of the population.

Comments and Conclusions

The broad picture presented here shows that influenza A was widespread throughout the Americas and Europe during the 1953 season, although some large areas were spared. It is to be remembered that during the previous season in 1952, influenza B was locally prevalent although not of such high incidence in North

America and Europe, and influenza A was practically absent. During the winter 1950-51, influenza A caused serious epidemics in northern England, particularly in Liverpool, and in northern Europe during December and January, and it was also occurring in the northeastern part of the United States. In the 1953 experience, the highest incidence in the United States was in the midwest and the south. The northeastern part which had been affected 2 years previously was largely spared with the exception of some military installations.

The mortality data here presented indicate that a significant number of deaths resulted from influenza and that this disease is still an important cause of deaths. This is true in spite of the availability of antibiotics and their presumed widespread use in the treatment of severe respiratory infections. Perhaps too

complete confidence in the ability of the antibiotics to reduce deaths from pneumonia, and thus alleviate the chief danger from influenza, may not be justified.

. . .

Current lists of laboratories and observers participating in the Influenza Study Program in the United States may be obtained from the Influenza Information Center, National Institutes of Health, Public Health Service, Bethesda, Md.

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Labeling Salt in Food

Two actions to protect persons suffering from some types of heart disease, or from high blood pressure, who are on "low-sodium" or "low-salt" diets have been taken by the Food and Drug Administration of the Department of Health, Education, and Welfare.

The aim of these actions is to improve the labeling of special dietary foods, and of certain frozen vegetables commonly used in low-salt diets, so that patients and physicians will be better able to calculate the sodium intake from such foods. In one action, the Department published a statement of policy in the Federal Register, to the effect that it will henceforth expect all labels of frozen vegetables to declare the presence of salt whether added directly or indirectly to these products.

FDA explained that frozen vegetables are quite commonly supposed to be salt-free, and on that account are largely used in low-salt diets. Actually, salt brine is used in the preparation of

certain of these vegetables, particularly frozen peas and frozen lima beans, as a means of quality separation (the younger and more tender peas or beans will float in the brine). This process may add a substantial amount of salt to the frozen product, which would be of significance to persons seeking to restrict their salt intake.

In the second action, the Secretary of the Department of Health, Education, and Welfare gave notice in the Federal Register that public hearings will be started on December 15, 1953, in Washington, to amend the FDA dietary food labeling regulations so as to require label declaration of sodium in low-sodium foods on the basis of their sodium content in milligrams of sodium per 100 gm. (roughly one small serving) of the food. FDA said that the declaration of sodium content on this basis conforms with the recommendation of the American Heart Association and the Council on Foods and Nutrition of the American Medical Association.

New Orientation in the Teaching of Preventive Medicine

By W. PALMER DEARING, M.D.

ALL OF US in this world conference on medical education are concerned with methods of equipping the physician of tomorrow for his full role in raising the level of health of the people he serves. That role will obviously vary from place to place and from time to time, depending on the particular health problems that predominate in a given country and on the capability of medical knowledge to solve those problems.

No system of medical science and thought in the world today can claim the capacity to solve all health problems. Some diseases of world-wide prevalence, such as malaria and enteric infections, cannot be dealt with effectively without the application of engineering and sanitary science. Others, such as the nutritional deficiency diseases, cannot be dealt with effectively

without attention to economic and social conditions.

Moreover, since no physician can function apart from the society in which he lives, his role will depend upon the degree of acceptance which the people give him. H. Cullumbine (1) found, for example, in his recent survey in Ceylon, that practitioners trained in Western medicine and those trained in the Ayurvedic systems were each called upon to treat about one-fourth of the illnesses reported by some 18,000 families, and that 1 in every 20 sick persons was receiving treatment from both types. Dr. Cullumbine comments: "Patients with illnesses which Western medicine has shown it can control are placed in the care of Western practitioners; where such superiority on the part of Western medical science has still to be conclu-

Dr. Dearing has been Deputy Surgeon General of the Public Health Service since 1948 and a commissioned officer of the Service since 1934. He began his public health work as an assistant in epidemiology at the Harvard University School of Public Health working with the late Dr. Milton J. Rosenau in teaching preventive medicine and hygiene to medical students. His assignments with the Public Health Service have included studies in tuberculosis epidemiology under the late Dr. L. L. Lumsden and early work with small-film X-rays. In 1945 he was deputy chief of the Division of Public Health Methods and in 1946 was named chief of the Division of Commissioned Officers in which post he was instrumental in undertaking a complete over-

hauling of policies and programs for recruitment, professional training, and assignment. During World War II he served as chief medical officer of the Office of Civilian Defense and as personnel chief of the Health Division, United Nations Relief and Rehabilitation Administration.

This paper was presented before the First World Conference on Medical Education at London, August 25, 1953. The conference, on the theme "standards of undergraduate medical education," was held under the auspices of the World Medical Association in collaboration with the World Health Organization, the Council for Organization of Medical Sciences, and the International Association of Universities.

sively proved to the layman, then help from the traditional Ayurvedic system is sought." I venture to predict that a similar study in any other society, Western or Eastern, would reveal a comparable independence on the part of patients in their choice of physician.

Terminology differs in England and the United States, as all of us are aware. The British physician refers to "social medicine"—the American, to "preventive medicine." Recognizing the terms as interchangeable, I will use the nomenclature of my own land.

The Need for Orientation

One of our philosophers, Professor Theodore M. Greene, of Yale University, describes the ideal doctor as "one who understands the human body as completely as possible in the light of all relevant sciences, who understands the human mind and its working as well as possible in the light of all relevant modern psychology and psychiatry, and who in addition understands a human being in his full potential spiritual stature" (2). In the light of modern health problems, I would add to this the requirement of an understanding of the physical and social environments in which his patients live.

If we in this conference can agree on these attributes of an ideal physician, we will readily discern the need for new orientation in the teaching of preventive medicine. For, although medical education today does a superlative job in giving the medical student a thorough grounding in anatomical and functional pathology, and skill in diagnosis and therapy, most people agree that it falls short in developing the deep understanding of human nature and human behavior which the physician must have if he is to practice prevention as well as to cure; to promote health as well as treat disease. Likewise, the medical school too often fails to prepare the student to apply the universal principles he has learned in settings other than that of the completely equipped and fully staffed teaching hospital. The medical school, therefore, needs to be as well grounded in the social milieu in which its graduates will practice as in the latest findings of medical science.

This means that no standard pattern for medical education can be applicable in all times and

places. What society requires of a medical school in Edinburgh or Boston will not necessarily meet the needs of society in Thailand or Lambarene. Yet the faculties, students, and practitioners in all these widely differing societies have much to share in knowledge and experiences.

Some Unsolved Problems

In this spirit of exchanging experience, I shall talk of our efforts in the United States to reorient certain aspects of medical education from the standpoint of preventive medicine, and I shall discuss some of the unsolved problems in my country.

Like my colleagues in public health work, I know that preventive medicine is not the exclusive field of the public health specialist. The increasing problem of cardiovascular diseases and cancer, of diabetes, rheumatic conditions, and mental disorders cannot be controlled by environmental sanitation, by immunization, or by quarantine. The recent shifts in the major causes of death and disability require the practicing physician to use preventive techniques in combating the health problems of a population whose proportion of old people is increasing. He must use all available health resources in a community to achieve early case finding, prompt diagnosis and followup treatment, and rehabilitation services—all contributing to prevention insofar as they forestall continuing disability and premature death.

Public health can be thought of as the organized application of preventive medicine, and traditionally it has been concerned with the prevention of health threats to the community as a whole. The private physician, when he is consulted by a person in an acute phase of illness, tends to be concerned primarily with restoration of the health of the individual.

Medicine has made phenomenal progress in diagnostic and therapeutic techniques, and medical education is geared to introduce the student without delay to new developments in these techniques. The medical schools have well-established departments in the basic and clinical sciences staffed by specialists who keep abreast of current advances in their fields. What is lacking is equal concern to advance

the knowledge and application of preventive measures in controlling the conditions that undermine health.

Social Changes Affecting Health

During the last half century revolutionary changes have occurred in community life in the United States. In place of the large stable family in a small, self-contained community, where social relationships are well established and all age groups have a place, we find smaller family groups that move frequently from place to place and maintain few continuing contacts with their neighbors and relatives. Earlier dependence on grandparents and aunts and cousins in time of illness or economic distress is being replaced by dependence on the community and its institutions.

Concurrently, methods of production have vastly improved, making possible higher standards of living. Education at all levels has become more widely available. Regional differences and barriers are diminishing under the impact of rapid communications. The interdependence of the welfare of the individual and the community is manifested in the growth of a multiplicity of community hospitals, public health departments, social welfare agencies, and systems of social insurance which have developed to meet newly identified needs.

Conditions of work, increased leisure time, and diversified recreational activity also manifest sharp contrasts with the past. High tension in both work and play and problems of personal relationships produce or intensify not only the emotional but also many of the physical disorders that are prevalent today. Prevention and treatment of these disorders require knowledge of the interplay of personal and environmental forces which condition man's behavior and his health.

Moreover, there is need for a new look at the modern environment. Preventive medicine research in the past found the sources of many infectious diseases in the insanitary environment, and today it is necessary to study the industrial and urban influence as the possible source of continuing and new health hazards which may be controlled on a community-wide basis. Pollution of the air and water by industrial wastes, substandard housing, and ex-

posure to new chemicals of unknown toxicity are all parts of the modern environment which contribute to the major health problems of the United States.

The Physician's Role in Preventive Medicine

The changes in American life have been accompanied by parallel changes in medical practice. Forty years ago, the family practitioner had intimate personal knowledge of his patients and their families. Today, however, he is yielding ground to relatively impersonal hospital practice by specialists, each often concerned with but a fraction of the total problem confronting the patient. At the same time, increased scientific knowledge and public understanding of health requirements have broadened the demands upon the medical profession.

Today's physician should be equipped to deal with the effects of the total environment on health—the social environment as well as the physical. He should be prepared to plan the total health care of the patient, preventive as well as therapeutic. Exclusive attention to a restricted range of biological phenomena can no longer be considered good medical practice.

There are many evidences that undergraduate medical education in the United States today falls short of preparing physicians for their full role in health maintenance and the prevention of disease. A conference on psychiatry and medical education, held in 1951, concluded that there is a concerted demand that physicians assume responsibility for the proper practice of preventive medicine. A questionnaire distributed to 3,500 community leaders throughout the United States by the conference's Preparatory Commission brought some 700 opinions that physicians of today are not giving the service expected of them. Some of the specific statements were: "They do not have time or inclination to listen to and consider the patient's feelings." "They do not have enough knowledge of emotional problems and socioeconomic family backgrounds." "In treating physical disease, they are often out of touch with the personal and social problems and pressures of the rank and file" (3). The conference report stresses the need for a greater mutual understanding between individuals and their

personal physicians and a greater degree of collaboration in the promotion of health.

Accurate diagnosis and prescription of remedies and treatment regimens taken by themselves may be of little avail in preventing illness or its recurrence. For example, a physician writes on Mrs. X's record: "Malnutrition slight. Inadequate intake due to poverty. Treatment: codliver oil tablets. Return in 1 month." The social worker, who has been in direct touch not only with Mrs. X but also with her family, has a broader view of the situation and, I think you will agree, a more constructive approach to treatment. She has studied the family budget and knows its limitations. She is helping Mrs. X to find a cheaper apartment nearer her husband's work in order to stretch the earnings. The social worker is thus taking action to prevent serious malnutrition by helping the family to have more money and food.

Another illustration comes from the family adviser service in the University of Pennsylvania Medical School. Mrs. G had high blood pressure and according to the family had no other health problems except that her father-in-law was ailing and irritable, and the children might be better off if they could play outdoors. The student health adviser's sympathetic talks with the father-in-law induced the latter to undergo regular treatment for his pernicious anemia. The health adviser also found a nearby church whose minister was delighted to have the churchyard used as a playground. Mrs. G's blood pressure, to her surprise, kept going down. The medical student who served as the family health adviser might have needed many years of experience in practice to learn for himself that high blood pressure can sometimes be alleviated by treating some other person's ailments and by getting a playground for the children (4).

I am sure that the experience of my colleagues in other parts of the world leads to the same conclusion we are arriving at in the United States: that the diversity of specialized medical and related services available in the modern community requires today's medical student to have knowledge of all community resources for preventive medicine. He must learn how to establish working relationships among a variety of specialized personnel and facilities if people

are to receive the services needed to prevent and treat illness and to return patients to useful activity.

In addition to his concern with individual patients and their families, the physician should also be prepared to assume leadership in the attack which the community makes upon health problems through the organization and operation of community health services. If medical schools are to do a good job in training the physicians for this leadership role, they must give attention to the health problems of communities as such. Medical schools as well as their graduates should realize that, if physicians relegate themselves to the role of medical technician, there is real danger that leadership in organizing medical and related services which the public demands will, by default, be forced upon others.

Strengthening Communication and Teamwork

Dr. Alan Gregg, in an address at the annual meeting of the Association of American Medical Colleges in 1952 (5), made an eloquent plea for better communication among the numerous specialists in medicine and between medicine as a whole and the public at large. He draws a striking analogy between the paralysis, necrosis, and other disturbances of function which result from disruption of the communication systems within the human body—the lymphatics, the blood vessels, and the nerves—and the eventual fate of medicine if some way is not found to foster communications between the "steadily proliferating subdivisions, bailiwicks, precincts, disciplines, and specialties." I would like to elaborate Dr. Gregg's thought to identify the social sciences—sociology, anthropology, and economics—as disciplines with which medicine must specifically improve communication.

These questions of communication and teamwork are the active concern of medical educators. The Association of American Medical Colleges joined with the American Psychiatric Association in organizing and conducting two conferences on psychiatry and medical education, one of which was mentioned earlier. The Association of American Medical Colleges similarly sponsored and took an active part in a

Joint Conference on the Teaching of Preventive Medicine. The experience gained in these three conferences has led the Association of American Medical Colleges to plan a series of teaching institutes to cover the entire structure of medical education.

Dr. George Packer Berry, dean of Harvard Medical School and past president of the association, reports that these institutes, to be held at annual intervals, will include sessions to consider the interrelationships in teaching among groups of the basic sciences, medical ecology, clinical teaching including the internship, and specialty training and the continuing education of the physician (6). As a device to focus the interest of the several medical departments on methods of integrating their work, these institutes will promote mutual understanding and community of purpose among the various specialized subdivisions of medical education and the related institutions in the community.

A national Commission on Chronic Illness, established in 1949, held a conference on the preventive aspects of chronic disease in 1951 (7). All interested professional groups were represented. In addition to medical education, health and social welfare agencies and the public were represented. That conference produced an inventory of current scientific knowledge concerning the nature and prevention of the chronic diseases. Considered also was the problem of improving care for the chronically ill, covering such fields as professional education and organization and coordination of services. Medical educators and physicians who participate in such conferences contribute sound medical guidance. At the same time they gain a deeper insight into the skills and potential contributions of other professions in dealing with common problems.

A national conference on cardiovascular disease in 1950 (8), in addition to sections on technical knowledge and research, included important committees on community services for education and prevention, on case finding and epidemiology, on facilities and services for treatment and management, and on integration of community services. Represented in these committees were medical educators, cardiologists, health officers, hospital directors, and commu-

nity service agencies. The professional education committee dwelt upon the importance of including broad knowledge of the techniques and resources for prevention in the teaching programs for every profession.

In the same year a national conference on aging and its problems (9) considered a wide variety of social and economic factors involved in satisfactory health maintenance, work, recreation, religious activity, and living arrangements for the aging population. A section of that conference also stressed the need for giving professional personnel a clearer insight into the total phenomenon of aging in addition to their specialized technical instruction.

These and other conferences, groups, and seminars have contributed materially to the complex task of pulling together the viewpoints of traditional and emerging specialties in health and related fields. They have aided in identifying common interests and purposes; and they have set a base for the interchange of concepts and ideas which we know to be important to the preventive medicine component of modern medical education.

Strengthening Education in Preventive Medicine

Let us now consider some of the specific steps that some institutions are taking to meet the challenges we have been discussing. Methods of getting the student to see patients as individuals with families and jobs; of getting social science skills and viewpoints into medical schools; and of getting medical schools and their communities into more effective relationship with each other are being actively sought.

We are trying, for example, to restore some of the values formerly realized in the apprenticeship training on which medical education was once largely based. Obviously, we do not want simply to return to the past or to discard the advances of the last century. We do want, however, to improve methods by which the medical school itself can give the student an opportunity to complement his specialized training with an understanding of the role of the family physician.

Experiments being conducted in several schools in the United States represent the gradual introduction into the medical faculty

of representatives of the social sciences. This process started with the employment of social workers to assist in the clinical teaching of the social and community aspects of medicine. More recently sociologists have been appointed to several faculties to develop the application of the social sciences to medical education and research.

As an additional step in integrating the various essential components of medical education, several schools are experimenting with the expansion of their relationships with the community. These efforts are designed to provide a useful teaching and research laboratory in comprehensive medicine and are similar to experiments being conducted in other countries for similar purposes. Dr. Richard Scott (10) has recently described the Edinburgh University general practice teaching unit in which selected medical students are introduced to a "family doctor practice" for some 2,000 patients. The unit comprises two physicians, a public health nurse, a medical social worker, and a pharmacist. Dr. Scott points out that the students seem at first to be preoccupied with clinical matters, then become increasingly interested in the preventive aspects of general practice. During the next step the student talks more freely with the patient and becomes concerned with the physical and economic components of the patient's background.

In addition to their value as additions to the armamentarium of medical education, these developments will undoubtedly improve medical education's understanding of community needs and responses, and they will strengthen channels of communication between clinical medicine and other professional disciplines. This communication is essential to the practice of preventive medicine, and the opportunity for students to observe patients in environments other than the hospital ward should be of the greatest practical value.

Not all medical educators, however, are convinced of the feasibility or even the desirability of expanding the community relations of the medical school. A number of the deans interviewed in a study conducted by the Public Health Service (11) indicated that the costs of providing community services were a major deterrent; others cited problems of personnel

shortages. Some deans even questioned the propriety of extending the influence of medical schools through community services. They feared that such developments would divert the schools' already inadequate resources from the major functions of training and research.

This fear is understandable because of the financial crisis which is facing medical education in the United States. The great advances in medical science make medical education increasingly expensive.

An understanding between the community and the medical school of the role and responsibility of each, however, would allay the fears of medical educators about the burden of community service and would help materially to solve the financial problems of many schools. The high-grade medical service which accompanies clinical teaching constitutes a great benefit to the community, but it is simply a byproduct from the point of view of the medical school. In many parts of our country, it is, nevertheless, still customary to charge the cost of this service, including the full expense of operating a university hospital, to medical education. With this sort of bookkeeping, it is not surprising that a dean should view with concern a suggestion that he add to his costs and dilute the efforts of his already overworked faculty in order to supervise medical students in the community. The community needs to appreciate the service its citizens receive, either in a hospital or elsewhere, and to work out with the medical school a proper allocation of costs and assume its responsibility of paying for the medical service. If this is done, the medical school will have adequate resources to finance what is increasingly recognized as an essential part of its educational program.

Experiments in Community Service

Despite the questions and complexities, however, some medical schools are experimenting with methods to help their students to observe and understand the influence of home and family factors on health. Some of the devices which have been developed are social case studies; preceptorships; assignments of students to general practice clinics or as family advisers; and participation in home care programs.

In addition, several medical schools are assuming broader responsibilities for participating in the development of effective patterns of community health service. Each of these methods increases the student's opportunity for participation in the practice of preventive medicine and helps the medical faculty maintain a high degree of awareness of community structure and health needs.

Social Case Studies

Several medical schools in the United States are actively experimenting with methods of providing closer contact between medical students and the physical and social setting in which their patients live. One striking example is the family adviser service at the University of Pennsylvania Medical School (12). In this program a student, throughout his 4 years of undergraduate training, observes and studies all factors that affect the health of a carefully selected family—housing, food, manner of living, and family relations.

Other medical schools are endeavoring to orient students in the recognition of the importance of social factors of illness by having students conduct medical-social family studies during their supervised clinical experience. These studies are made with the aid of the social service departments of the teaching hospitals and include home visits (13, 14).

Preceptorship

The preceptorship is an adaptation to modern standards of practice and a modern social setup of the old apprenticeship method of training. Some medical schools assign senior students for several weeks or months to preceptorships with general practitioners. At the University of Nebraska, one of several institutions which has adopted this practice, evaluation of the program indicates that it equips the student with a perspective concerning the needs of individual patients and their families, the demands of general practice, and community resources (15, 16). The student has an opportunity to observe the methods used by skilled physicians in serving their patients. He sees patients in their normal home and working environment and observes the way in which physicians draw on public health, welfare, and

other agencies in dealing with the health and related problems of their patients.

The preceptorship system obviously needs careful selection of practitioners who can maintain close relationships with the medical schools in furthering the goals of the plan. The practitioners must, of course, have the time, competence, and type of practice needed to give satisfactory apprenticeship training. There also must be safeguards against the danger that the students will be used for services that have little educational value and thus lose the opportunity for learning the satisfaction of serving patients as people.

General Practice Clinic

Several schools are experimenting with the use of a general practice clinic for instructing students, in place of the exclusive use of specialty clinics. One such experiment is in progress at the University of Tennessee (17) where a large percentage of graduates enter general practice. Family practitioners in the community are on the staff of the "family general practice clinic." They assume primary responsibility for the care of the patient and have available specialists as necessary. The students thus have an opportunity to work with physicians who know at first hand the problems and resources of their community. They also study social and environmental factors in health and illness with the aid of a social worker assigned to the clinic.

A similar program adapted to practice in an urban area is that at the Cornell University School of Medicine (18). In this New York City institution, senior students are assigned for 22½ weeks to a combined clinic in medicine, pediatrics, psychiatry, and preventive medicine. A full-time staff from the departments of medicine and pediatrics forms a nucleus for the organization of this teaching device. The department of preventive medicine focuses all its fourth-year teaching in the clinic. A full-time social worker and a visiting nurse are assigned to the clinic, and part-time specialist consultants are available.

There are many other developments in the direction of expanding community relations of medical schools, but these indicate the trends.

Mentioned earlier were the contributions the social sciences can make in the preparation of physicians for their full role in the practice of preventive medicine. By drawing on the departments of sociology, psychology, anthropology, and economics, for example, some schools are enriching the curricula of premedical and undergraduate medical education. By bringing the social case worker onto the team of physicians, students, and nurses in the experimental programs described, some medical schools are providing valuable learning experience in social diagnosis and therapy.

There are other fields in which the social sciences can be used more extensively and to great advantage in medical schools. In the selection of applicants for admission, for example, medical schools might well draw on the techniques of educational psychology. These techniques are aimed at more precise evaluation of a candidate's personal attributes so as to distinguish those individuals who give promise of success in the study and practice of medicine.

Application of new knowledge in the psychology of learning can aid the medical school in improving its methods of teaching. Recent studies clearly indicate the need for greater use of visual aids in the teaching of "didactic" subjects. Greater understanding of the dynamics of interpersonal relations, moreover, will help in promoting interdepartmental collaboration at the faculty level, both within the medical school and with other colleges of the university.

Finally, there are large fundamental problems in preventive medicine and public health which cannot be solved without the combined efforts of medical research with social and biological research. When a major health problem of a community is being solved by treating the environment—as in enteric infections—many millions of individuals are protected from disease without realizing what has happened.

However, when the preventive measures require individual decision and action, we are faced with fundamental problems of individual and group behavior. This is true in gaining a family's acceptance of immunization or a mother's acceptance of healthful practices in infant and child care. The task is even more

difficult in gaining the cooperation of individuals and families with the physician in his efforts to prevent chronic disease and mental illness and to maintain personal health.

Research into the "how and why" of individual and group behavior is being recognized by many leaders in preventive medicine and public health as essential to professional education and to sound planning of public health programs. Such research involves both the medical and social sciences, and the medical school can be a leader and a partner, through the initiation and support of studies in cooperation with the schools of social science.

Conclusions

The 4 years that the undergraduate student spends at medical school represent, of course, only one phase—though an extremely important one—of a life-time training in preventive medicine. His home environment, his earliest schooling, and his premedical education lay the foundations for his medical career and for his role in family practice, in a clinical specialty, in industrial medicine, in hospitals, in public health, in research, or in teaching future physicians.

Raymond Allen, the physician-president of one of our large universities (19), has expressed a thought with which I would like to close. He says, "Medicine with its age-old concern for the sick, the poor as well as the rich, the weak as well as the strong, has been an influence for good surpassed only by the moral precepts of religion." Medicine of the future, if it is to progress as a social as well as a biological science, must broaden its outlook and adjust its educational program accordingly.

I believe we can all agree that as Dr. Allen states, medicine is coming of age as a social science in the service of society.

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Increase in Social Insurance Recipients

As of July 1953, 4.4 million people were receiving old-age and survivors insurance benefits under the Social Security Act, and 2.6 million people over 65 were receiving old-age assistance payments, according to the Social Security Administration, Department of Health, Education, and Welfare.

In 37 States, more old people received these insurance benefits in 1953 than received old-age assistance. This was true of only 22 States in 1951. The States in which old-age assistance recipients still outnumber those receiving social insurance benefits are mainly agricultural and include a number of low-income States.

The major shift during the last 2 years from assistance to insurance as a source of income for the aged is largely the result of 1950 amendments to the Social Security Act which made more of the aged eligible for insurance benefits.

Experiments In the Control Of Schistosomiasis In Brazil

By WILLARD H. WRIGHT, Ph.D., and
CHARLES G. DOBROVOLNY, Ph.D.



Australorbis glabratus

SCHISTOSOMIASIS, a disease caused by three species of human blood flukes, *Schistosoma haematobium*, *S. mansoni*, and *S. japonicum*, is widely distributed in Africa, the Near East, the Orient, the Caribbean area, and parts of South America. It has been estimated (1) that there are 114,400,000 individuals in the world who are infected with the disease. It usually runs a chronic course, and the patient may suffer for years before finally succumbing to the cumulative damage or intercurrent infection. In most endemic areas, natives are

continually exposed to the disease, and repeated infections are the rule.

Schistosomiasis is not an acute fulminating disease with the spectacular manifestations of cholera, yellow fever, or some other bacterial or viral infections. Because of this, the public health importance of schistosomiasis has received little attention until recently. However, now that the success of residual insecticides in malaria control has been demonstrated, health agencies in some countries are encouraged to devote more attention to the possibilities of

Dr. Wright has been chief of the laboratory of tropical diseases, National Institutes of Health, Public Health Service, since 1939 when the laboratory was known as the division of zoology. Dr. Wright was field director of the Army Surgeon General's Commission on Schistosomiasis in the Southwest Pacific and Japan in 1945-46. He has been past president and councilor of the American Society of Parasitologists. He is currently a lecturer in medical zoology at the George Washington University School of Medicine and a visiting lecturer in tropical public health at Harvard University.

Dr. Dobrovolsky, a parasitologist on the staff of the laboratory of tropical diseases, National Microbiological Institute, National Institutes of Health, came to the Public Health Service in 1948 from the University of New Hampshire, where he was chairman of the division of biological sciences. He participated in the laboratory's malaria study in Guatemala in 1948-50 and since 1951 has been at Recife, Brazil, working on the field experiments with molluscacides.

*On the frontispiece of this issue of Public Health Reports are shown all stages in the life cycle of the human blood fluke, *Schistosoma mansoni*.*

controlling schistosomiasis by means of vector elimination.

An Economic Burden

Because of its debilitating nature, schistosomiasis exacts a considerable economic toll in many areas in which it is endemic. In Egypt, it is estimated that the disease costs the country approximately \$57 million a year and lowers the productivity of the population by 33 percent. In Japan, health officials of Fukuoka and Saga prefectures have estimated that the cost of the disease in the endemic area on the island of Kyushu runs to \$2,522,200 a year in wages alone, not counting costs of medical care. Since schistosomiasis is highly endemic in many of the world areas from which the United States draws strategic materials, the disease, along with other tropical infections, represents a substantial tax on imports which this country buys from such areas.

In 1943, the laboratory of tropical diseases of the Public Health Service undertook, at the request of the Surgeon General of the Army, certain studies on schistosomiasis of importance from the standpoint of military preventive medicine. Somewhat later, when it appeared that military personnel might become infected with the disease and serve as focuses for possible establishment of the disease in the continental United States, experiments were undertaken to determine whether any domestic species of snails could serve as intermediate hosts. The effect of water and sewage treatment processes on infectious material was also studied.

Studies on Snail Destruction

The availability of suitable snail hosts in laboratory colonies provided the opportunity for studies on snail destruction as a method of control for the disease. These studies were inaugurated after World War II, and many hundreds of chemical compounds were screened for their effectiveness against *Australorbis glabratus*, the snail which serves as intermediate host of *S. mansoni* in the Caribbean area and certain parts of South America (2). The results of the laboratory tests provided data for a correla-

tion between chemical structure and molluscicidal activity and indicated a number of compounds with sufficient promise for field testing. Initial tests were carried out in Texas (3) against snails closely related to vectors in South America and later against *A. glabratus* in endemic areas of the disease in Puerto Rico (4). Subsequently, in cooperation with the Mutual Security Agency and the British Colonial Office, tests were extended to Nigeria and Sierra Leone by personnel of the laboratory of tropical diseases.

Among the chemicals tested in the field, sodium pentachlorophenate has proved one of the most effective. This chemical is in ready supply commercially and is reasonable in cost. In one test in Puerto Rico, a single application costing \$7 destroyed all *A. glabratus* present in a stream $3\frac{1}{2}$ kilometers long, and the area remained free of infestation for several months. At Tudun Wada, Nigeria, \$3 worth of the chemical eradicated all of the schistosome vectors (*Biomphalaria pfeifferi* and *Physopsis africana*) from a stream 2.2 km. in length, and the stream remained free of these snails for nearly 11 months. At Rigachikun in northern Nigeria, these same species were eradicated and remained absent for 16 months from a stream 4.4 km. in length at a cost of less than a half penny per person of the population in the area.



Technician removes snails from tanks in preparation to test snail-killing efficacy of chemicals. Experiments conducted at the laboratory of tropical diseases, National Institutes of Health, Public Health Service, Bethesda, Md.

No Specific Treatment

The attack on the molluscan intermediate host offers one of the most promising approaches to the control of schistosomiasis. At the present time, there is no specific treatment for the disease, and efforts to effect control through chemotherapy have generally resulted in failure. Sanitary control through the proper disposal of excreta containing the ova of the parasite is complicated in many parts of the world because of religious or agricultural practices. Furthermore, many workers in certain types of agriculture are constantly exposed to infection, thus creating an occupational hazard. For these reasons, it would be difficult to change present practices for the purpose of avoiding infection.

Cooperative Project in Brazil

The preliminary field trials on snail destruction led to an extended study of certain molluscacides under field conditions in Brazil. This cooperative project was begun in February 1951 under the auspices of the Pan American Sanitary Bureau and at the invitation of the Ministry of Education and Health of Brazil. Two scientists from the laboratory of tropical diseases, National Institutes of Health, were detailed to the project, and transportation in the country, technical assistance and equipment, and laboratory space were provided by the Brazilian Ministry of Education and Health.

Headquarters for the project were established at the Instituto Aggeu Magalhães in the seaport city of Recife in the state of Pernambuco, which is in the heart of a highly endemic schistosomiasis region. This region, 7° to 15° south of the equator, extends from a narrow littoral along the Atlantic Coast to a low plateau several hundred miles inland. The plateau is intersected by numerous small rivers along which most of the villages and towns are located. The climate is tropical, humid along the coast, and dry in the semidesert area in the interior. The annual rainfall ranges from about 80 inches along the coast to a few inches on the inland plateau, almost all of it falling in the months from March to September.

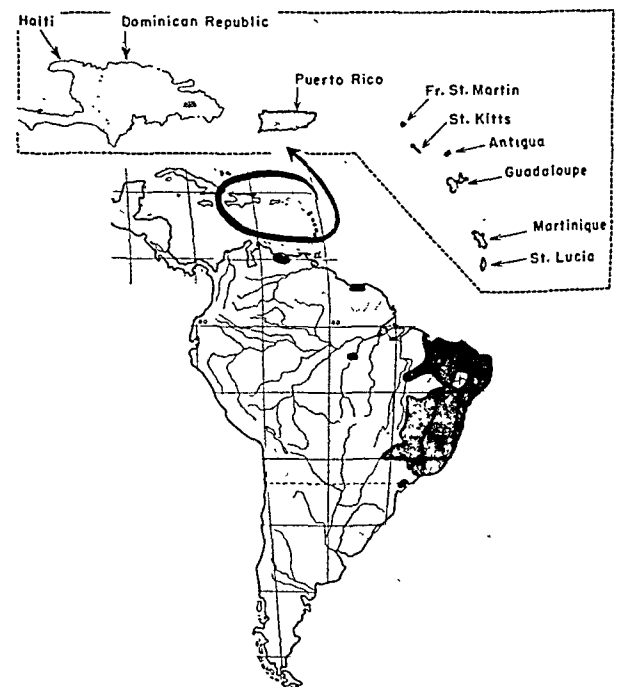
The snail intermediate hosts, *A. glabratus*

and species of *Tropicorbis*, inhabit many of the fresh water streams, lakes, and drainage and irrigation ditches in this region. Because sanitary facilities, except in the largest cities, are completely lacking, these waters are used for all washing, bathing, and laundering. Water for cooking and drinking is frequently procured from the same sources.

Field Trials With 33 Chemicals

Thirty-three chemicals which had proved to be 100 percent effective against *A. glabratus* in concentrations of 10 ppm or less in tests conducted in the laboratory of tropical diseases were sent to Brazil for field trials.

Initial field trials with each compound were made in isolated test plots in still water pools or ditches. In some instances, dams were constructed in ditches to isolate control areas from treatment areas. Just before application of the chemical, the volume of water in liters of each test plot was computed from measurements of the length and the mean width and depth.



The highly endemic schistosomiasis regions in the Caribbean area and in South America are shown above in the shaded areas. Note particularly the coastal area of Brazil.

In the first experiments with each compound, the same method of application was employed—a solution or suspension of the chemical dispensed with a compressed air sprayer at a calculated rate of 10 ppm. Later, other methods of application, depending on the composition of the compound, were often employed. Some compounds were mixed with inert materials like talcum and applied with rotary dusters. Compounds in solution were soaked in dry sawdust, which was then dispersed by hand (5). The different methods employed with a given compound were usually about equally effective. Compounds found to be effective applied at 10 ppm were then tried in lower concentrations.

The pretreatment snail survey of each test plot was made shortly before the chemical was applied. Posttreatment surveys to determine the effects of the compounds on snails were made weekly or more frequently. The effectiveness of the chemical in each survey of each experiment was expressed in the percentage reduction in the snail population. The effectiveness at 10 ppm of 33 compounds in preliminary field trials in static waters was determined over a 6-week period following application. The results beyond 6 weeks of observation are not directly comparable because some test plots dried up.

The effectiveness of 8 of the 33 compounds tested was 90 percent or less. With 18 compounds, results of various trials showed complete kill of snails in some instances but only 90 percent reduction in snail population in others. The remaining 7 compounds found to be 99 to 100 percent effective against the snails in all tests were: pentabromophenol; pentachlorophenol (Hercules special emulsion); copper pentachlorophenate; sodium pentachlorophenate; bis(3,5,6-trichloro-2-hydroxyphenyl) methane; sodium salt of bis(3,5,6-trichloro-2-hydroxyphenyl) methane; and phenyl mercuric acetate. Most of the above compounds were also 95 to 100 percent effective when applied at a concentration of 2 ppm.

Value of Sodium Pentachlorophenate

Since many of the flowing streams in the highly endemic schistosomiasis region of Brazil are infested with snails, it is essential that mol-



Workers collect snails from one of the snail-infested streams in the state of Pernambuco, Brazil.

uscacides be effective in flowing water. Of the chemicals tested in streams, sodium pentachlorophenate proved to be the most effective. Because this chemical is not very toxic to mammals in the concentrations employed, it was used in extensive field trials in flowing waters.

In these experiments, the compound was usually applied at the head of the stream and in some instances at selected intervals along the stream. The amount of chemical to be applied was calculated from the rate of flow for a given number of hours at selected levels downstream. In most streams, the rate of flow was determined with the aid of a pigmy current meter or by construction of a weir. Different methods of application employed gave satisfactory results. Observations were also made on the rate and extent of dispersion of the compound in streams from samples of water (6) taken at various points below the sites of application. It was found that the disappearance of chemical from the water below the site of application in the stream was usually greater than expected on the basis of calculation. In most of the streams, the rate of disappearance was so rapid that little chemical was carried downstream more than 4,000 feet.

As might be expected from the above observations, the kill of snails was least successful in the lower parts of the stream. In most of the streams, the chemical was most effective in the area down to 1,000 feet below the site

of application, indicating the intervals at which application should be made. It was also found that sodium pentachlorophenate is usually most effective when applied at concentrations of at least 10 ppm. On the other hand, concentrations exceeding 20 ppm applied for 8 hours or more did not enhance the molluscicidal effects of the compound. The effectiveness is a function of time of application as well as of concentration. Thus concentrations as low as 2 ppm maintained for 40 hours were about as effective as high concentrations for 8 hours.

Effective Snail Abatement

A marked reduction—frequently 100 percent—of snail populations in streams was observed following a single application of sodium pentachlorophenate. No living snails were found in 11 of 28 streams during the first month after treatment, and in parts of some streams no living snails were discovered over a 12-month period. However, most of the waters from which the snails appeared to have been eradicated were repopulated by the fourth month after treatment. The sudden appearance of mature and large specimens in snail-free waters indicated that reinfestation was accomplished by snails which were not in the water at the time the chemical was applied. These streams appeared to have become reinfested in a number of ways. In moist, shady habitats, snails often migrate to the wet banks, and following treatment may return to the streams. Snails left stranded on the banks of streams following high waters and snails raked on the banks with vegetation when streams are cleaned go into estivation. During rains they may migrate or be washed back into the snail-free waters.

Since a single application usually produced effective control for about 3 months, various field trials were made to determine the effects of repeated applications of sodium pentachlorophenate at different levels of the stream and at selected intervals of time. In most of the sur-

veys made in these streams for periods up to 12 months, the reduction in the snail population was 95 to 100 percent, based on the first pretreatment snail counts. Results with the experiments conducted to date illustrate that effective snail abatement can be attained by treatments at intervals of 3 or 4 months. However, because of the ability of snails to survive in some of the ways mentioned, eradication of snails cannot be accomplished in 1 year.

In view of the different conditions under which sodium pentachlorophenate was applied, variable results were to be expected. Compared with the results reported elsewhere, there are indications that the technique of application of molluscicides may require considerable variation from one geographic area to another, depending on the ecologic conditions of the snails. In the main, the results obtained in Brazil have served to clarify some of the problems encountered in snail control and to suggest the need and direction for further experiments in the solution of these problems.

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Sanitation Problems in a Suburban Area

—Jackson County, Missouri—

By JACK K. SMITH, M.S.C.E.

JACKSON COUNTY, MO., is not a typical county. It may best be described as an urban-fringe area, or a girdle of homes, and schools, and shopping centers, of small industries, and small farms, and wide open spaces, which typically encircles a major city in the United States. Many of the workers in Kansas City, Mo., which lies within Jackson County's borders but not within its jurisdiction, have their homes in the residential communities which surround the city. With the growth and expansion of Kansas City, the problems of providing healthful living conditions for residents of the county become more and more complex. Sometimes these problems are not sufficiently known and are taken for granted.

Recently, the necessity for explaining the objectives of specific public health programs was brought forcefully to the attention of the Jackson County Health Department. Although the department had been in operation for more than 20 years, the Jackson County Court indi-

cated, when questioning the local unit about its purpose and activities, that in the thinking of the court, the activities of the health department centered around only one phase of health—the medical care of the indigent.

This lack of understanding on the part of the court, and undoubtedly on the part of the public, becomes all the more pertinent when one realizes that the Jackson County Court is not a part of the Missouri judicial system and that the term "court" is a misnomer—a vestige of the days when the judicial and administrative powers were combined in one local governmental unit. Apparently, the health department had temporarily failed in keeping the public, and likewise the court, continually informed about its purpose and its programs. It had failed, moreover, in explaining that its primary purpose is the prevention of sickness and that its activities were directed toward that end.

Community enlightenment is, of course, an essential ingredient of a health department's program. In Jackson County, as in other localities in the United States, the real purpose of a local sanitation program is improvement of the sanitary environment. But progress in any community program, let alone a health program, can be made only to the extent and at the pace desired by the residents of the community. No matter what value is placed on a local program by the professional health worker, the program, if it is to succeed, must have the support and understanding of the community.

Mr. Smith is in charge of waste disposal and stream sanitation in the bureau of public health engineering, Division of Health, Missouri Department of Public Health and Welfare. From October 1938 to May 1952 he was a public health engineer in the health departments of Jackson County and Jasper County, Mo. This paper is based on a presentation by Mr. Smith before the Illinois Public Health Association at its 1952 annual meeting in Springfield, Ill.

Some of the local sanitation programs in Jackson County have already benefited by public recognition of the need for their existence.

Milk Control Program

Jackson County's milk control program was inaugurated in 1940. It started slowly at first with an attempt to get the cooperation of the milk producers and dairies. A few, however, would not go along. One merchant in the vicinity of Kansas City made a "leader" of milk, which he obtained from any source and sold at a reduced price. County health officials explained to him that the milk control program was intended to assure a safe milk supply for the county, and told him to buy milk only from a rated source. The merchant, taking the attitude that the health department did not have the right to interfere, continued to sell ungraded milk.

At this point in the program, the health department decided to use enforcement as a means of education. Evidence of the merchant's selling ungraded milk was collected by the health department and presented to the magistrate's court, the lowest court in the county. The magistrate ruled in favor of the health department, and the merchant was fined. This was the only legal case involving the sale of milk which was ever tried in Jackson County.

The problem of milk control in the county area is diminishing because the large dairies in nearby Kansas City, Mo., are gradually taking over the distribution of milk. In 1940, there were about 50 small dairies in the county; most of these were raw milk dairies. Today, there are only 4 or 5 small dairies.

Because of overlapping milksheds, reciprocity in providing a safe milk supply was established with the Kansas City Health Department. The Kansas City Health Department now inspects all dairies selling milk within the limits of Kansas City; and milk plants licensed by the city health department are issued a permit by the county department. When Kansas City degrades a dairy, the county health department takes similar action. However, the few small pasteurization plants that are left—dairies that produce and pasteurize milk on the

farm—are under the supervision of the county department.

The cooperative inspection program between the city and the county extends beyond the city limits. Across the State line from Kansas City, Mo., is Kansas City, Kans., with a number of large dairies which have recently started to distribute milk in Missouri. Since these dairies are inspected and certified by the Kansas State Board of Health, the Jackson County Health Department decided to avoid duplication of inspection by accepting Kansas' certification. The Public Health Service through its regional office at Kansas City, Mo., provided a milk sanitation rating of the Kansas dairies desiring to sell milk in Missouri. Only dairies with a rating of 90 percent or higher were issued permits. It was mutually agreed that degrading by one State would call for similar action by the other. This agreement has been beneficial to both States.

In Jackson County, the disposal of the waste connected with milk production is a problem. Outside the limits of Kansas City, there are few public sewers. Dairies do not have access to these sewer systems. One large milk plant utilizes a high-rate trickling filter for the treatment of wastes, but results have not been satisfactory because of overloading and inadequate maintenance and operation. The small milk plants have no facilities for treating wastes. A simple, efficient, and inexpensive type of waste disposal system is greatly needed.

County Water Supplies

Water supply in Jackson County is primarily supplied by the municipal water plant in Kansas City, Mo., which serves the city and surrounding area through public water supply districts. There are eight such districts in Jackson County. Each district has its own board of directors. Each district has the power to vote bonds and extend the mains within its area. Water purchased from Kansas City is resold by the public water district. Thus, the municipal water plant serves about 95 percent of the population of the entire area. By this arrangement, the people of Jackson County have access to a water supply managed and operated by qualified technical personnel. Bac-

teriological samples from the eight districts are examined routinely by the Missouri Division of Health laboratories.

It would be difficult to develop individual water supplies in the county. There is no suitable underground supply except in the Missouri River bottoms, where ample water is found at a depth of 20 feet. The Missouri River forms the northern boundary of Jackson County. Sand-point-driven wells produce satisfactory water from a bacteriological standpoint. Away from the Missouri River, wells are seldom satisfactory. There are a few low-producing drilled wells, but a good drilled well is rare in the northern part of Missouri.

The water supply problem in the county is increased because the area is largely underlaid with creviced limestone, which permits little filtering action. Contamination from barnyards, septic tanks, privies, and other sources, enters the water stream through outcropping limestone ledges. Cisterns are used at many private homes and small public schools. Most of the water for these is hauled from one of the water districts. Water haulers are instructed to chlorinate each tank of water they transport. For one school with about 200 students every drop of water must be hauled. The school is otherwise completely modern, with flush toilets and a cafeteria. Several thousand dollars have been spent in unsuccessful drilling for wells. There simply is no water available in the ground.

Sewage Waste Disposal

The waste disposal problem resulting from the numerous housing developments in Jackson County presents a significant challenge to the county department. In April 1951, the Missouri Division of Health adopted a regulation for septic tank installations which requires a minimum lot area of 15,000 square feet with a minimum lot width of 75 feet, although 100 feet is preferred. This has helped to reduce the septic tank problem. The developer wishing to erect 50 or more houses is advised that he may use a lot size of 7,500 square feet if he installs a sanitary sewer system and a disposal plant. Several builders have done so. After completion, the disposal plants are maintained

and operated by the county sewer department.

A county of the first class can levy a maintenance tax for sewered areas and provide satisfactory maintenance. Counties are limited by law to one-fourth of 1 percent of the assessed valuation as the maximum that can be charged for operation and maintenance of a sewer system. A development needs at least 50 houses in order to bring in enough revenue to operate even the simplest type of disposal system.

In a subdivision of 50 to 75 houses the simplest type of sewage disposal system is a large septic tank, dosing chamber, and open sand filter. When given proper maintenance, the sand filters work very well. A sand filter requires continual maintenance and cleaning, but it produces a satisfactory effluent. Expensive to operate, the sand filter is a partial solution to the sewage problem because the disposal system is then centered at one point rather than dispersed among separate lots and individual owners.

The arrangement for the county to assume control of the sewage disposal system has worked out satisfactorily. Sometimes complaints are made that the revenue is not enough to take care of the expense, but this can be overcome largely by efficient operation. Personnel from the county health department make routine inspections of the disposal plant and report the deficiencies they find to the county sewer department.

Other Disposal Systems

There are other types of sewage disposal plants. In a development of 550 houses, a primary settling tank, separate sludge digester, trickling filter, and final settling tank have been installed to accommodate 275 houses. The system will be expanded to accommodate the ultimate capacity of 550 houses. The developer will operate the system until its completion and then deed it to the county.

The big problem, of course, is inducing the developer to put out that much money at one time. The cost, when the price of land is considered, usually will justify a community disposal system, and an appeal to the developer's pride has resulted in having some builders provide a sanitary sewer system.

Individual septic tank installations produce

many problems. The type of soil in Jackson County is not readily adaptable for the installation of soil absorption systems. A percolation rate of 10 minutes per inch is very good, but in almost all subdivision lots the percolation rate is the maximum permitted by the county, 30 minutes per inch. When the percolation rate exceeds the maximum, the builder is instructed to use some other type of system such as a sewer collection system with central treatment works or an installation of individual sand filters on each lot.

The individual sand filter creates problems too because the effluent from each filter must be carried away. In some instances a small sewer system is required. The cost of the individual filter installation exclusive of effluent drain is approximately \$150 more than that of the conventional absorption system. Numerous individual sand filters have been installed in spite of additional cost and effluent drainage problems. Builders and developers sometimes request permission to build 1 large filter to serve 5 or 6 houses, but this permission is not granted because it involves too large a maintenance problem.

However, the use of a common collection tile or sewer is permitted. It involves a minimum amount of maintenance. As yet no difficulties have been encountered with this type of drain, although some of the installations were made 5 years ago.

Jackson County has a readily available source of sand for use in sewage filters, but care in selecting the type of sand used is necessary. An effective size of from 0.6 to 0.8 millimeters, with a uniformity coefficient of less than 4, is required. Considerable labor is involved in producing sewage-filter sand. Ordinary building sand will give good results, but only for a short time because of its tendency to clog.

School Sanitation Progress

In a sprawling suburban area, the construction of schools lags behind the expanding population. Jackson County schools are overcrowded and probably will be so for some time. However, school districts are being consolidated. Gradually being eliminated are the small, one-room schoolhouses with their prob-

lems of cross-lighting, inadequate water, inadequate sewage disposal facilities, and other conditions not compatible with good health. School architects in the county have been cooperative in submitting school building plans and specifications to the health department. In reviewing the plans, the department checks the lighting, ventilation, drinking fountains, toilet facilities, accident and fire hazards, food service facilities, and water supply and sewage disposal facilities.

Schools with an enrollment of 200 to 300 students have difficult sewage disposal problems. Because most small towns lack public sewerage systems, the school has to develop its own sewage treatment plant. Usually, the installation consists of a septic tank, a dosing chamber, and an open sand filter. One public school has an absorption system with more than 5,000 linear feet of tile. Wherever possible, an open sand filter is used. With proper maintenance, very satisfactory results are obtained.

The high cost of school buildings has one advantage from the health department's viewpoint: New schools are being constructed without basements. It has been difficult to convince architects and school boards that a cafeteria or kitchen should not be placed in the basement. Newer schools now have well-lighted and well-ventilated cafeterias above-ground.

The importance of checking the complete set of school plans has been borne out by experience. Recently, an architect supplied for review only the plans of the sewage disposal system, which he thought were the only ones needed. The plans were satisfactory and provided for an absorption system of adequate capacity with a tile field in excess of 5,000 feet. However, when final inspection of the disposal system was made, it was found that the laterals were laid on top of a foundation drain. The submitted plans had not shown the foundation tile, but the complete set did. When the disposal system was constructed, the laterals were placed only a few inches above the foundation drain. As soon as the siphon discharged, the sewage seeped into the lower drain and then into the street. The contractor had to re-lay the foundation drain, removing it from beneath the laterals.

Nursing Home Inspection

In order to obtain a permit or license to operate a nursing home in Jackson County, certain minimum requirements must be met. The State legislature enacted a law regulating nursing homes in 1941. Inspection of nursing homes is the responsibility of the county health department and requires the services of the health officer, the sanitary engineer, and the public health nurse. The nursing home program includes investigation of the sanitation of the premises; patient care and treatment; record-keeping; fire, electrical, and physical hazards; food-handling practices; sources of milk and food; water supply; and sewage disposal.

One legal case involved a nursing home which was well operated and maintained but whose owners believed that they were not subject to the health department regulations. The home was not violating any sanitation regulations, but it refused to submit monthly reports, and also disapproved of health department inspection. In the ensuing litigation, the circuit court judge ruled that the State nursing home law was unconstitutional because it excluded homes healing by faith. However, the decision applies only to this home in Jackson County.

The failure of certain nursing homes to meet minimum requirements necessitated other court cases. The procedure in such instances is to inspect the home, interpret the findings to the operator, and allow sufficient time to make necessary adjustments to fulfill the requirements for licensing. At the end of this period, the home is reinspected; and then, if the recommendations have not been carried out, and there is no intention of following them, the case goes to the county prosecuting attorney.

The prosecutor writes to the nursing home operator, calling for a hearing at which the operator and a representative of the health department are present. The points in question are discussed. The prosecutor advises the operator to meet the requirements of the law. A reasonable time is given for compliance. If, at the end of that time, the operator has not complied, a warrant is issued for his arrest. Usually, the hearing concludes the matter.

The health department, of course, tries to

avoid hearings, principally because of the amount of time they take.

Taxing Trailer Residents

Along with other States, Missouri has sanitation problems peculiar to the people living in trailers. Trailer parks have presented a serious sanitation problem during World War II. The number of trailers has increased since the war. People are continuing to live in trailers. Their income frequently is high, and they choose to live in trailers not for economic reasons, but because they like it.

Almost all the sanitation problems common to a small city are found in a trailer park. Water supply, sewage disposal, garbage, and refuse disposal are the major items requiring supervision by the health department. Fortunately, all trailer parks in Jackson County are served by an approved public water supply. Where trailer parks are not served by public sewer systems, the trailer park sewerage systems consist of collection systems, septic tanks, dosing chambers, and open sand filters. In the county, there are 15 trailer parks varying in size from a 10- to 100-unit capacity. A water supply connection and a sewer connection must be provided for every trailer space.

In most instances, the older trailer parks were not properly planned, and little consideration was given to the location of waste disposal facilities. As a result of this lack of planning, there is insufficient area for waste disposal facilities and a need for pumping sewage. Odor problems are common because of the proximity of trailer spaces to the sewage filter beds. Use of chemical masking agents in sewage dosing chambers has provided some relief.

A large percentage of new trailers are equipped with showers, lavatories, kitchen sinks, and flush toilets. These improvements require sanitary sewer and water supply connections for the trailers. The central bathhouse of the typical park is rapidly disappearing. Centralized laundry facilities are, of course, still necessary. Laundry waste is treated with other sanitary sewage and has created no special problems.

Garbage and refuse collection and sewage disposal practices vary from good to bad. Ex-

perience indicates that the most satisfactory system is to provide a fly-tight metal container for each trailer unit and to accomplish disposal either by sanitary landfill or by incineration at a remote location. Most of the owner-made incinerators have not been successful. Central refuse containers require almost constant supervision to avoid abuse of the facilities.

The inherent problems of the older trailer parks created by the small unit spaces are being alleviated by the need for accommodating the new, larger trailers and the development of trailer park standards by the National Association of Trailer Coach Manufacturers.

Real estate interests and school authorities in the county strongly object to trailer parks. School authorities object because little, if any, tax revenue is obtained from the trailer occupants. A small school, or even a fairly large one, with a park of 150 trailers within its district, faces the problem of educating 50 to 75 extra pupils without adequate funds for additional space, equipment, or teaching personnel. The school board and others protest to the zoning board against a proposed trailer park and usually find a sympathetic audience.

Probably trailer park residents would not object to being taxed, but there is now no legal way in Missouri to tax them. The trailer coach manufacturers have asked the legislature for legislation to tax trailers for school purposes, but so far the State has adopted none. This problem will continue to exist until some form of legislation permits taxation of trailer occupants. (Note: The 1953 legislature passed legislation permitting counties to tax trailers for school purposes.)

The real estate interests have stated that trailer parks lower real estate values in their vicinity. But we believe that there should be a place in any county or community for well-

organized, sanitary trailer parks. Zoning authorities should select areas for such purposes so that there will be better trailer parks, rather than those which have just grown up from 2 or 3 trailers, adding to their original facilities in a hodgepodge fashion. Parks which are built according to a definite plan can be assets to the community. Health departments must face their obvious responsibilities toward the people who live in mobile homes.

Nuisance Adjustments

Many nuisance complaints can be adjusted during a careful interview with the complainant. Some complaints turn out to be purely personal grudges. Sometimes they are disagreements about a property line or a fence, and the health department is used as a moderator.

The first question asked the complainant is "Have you talked to your neighbor about this insanitary situation?" Generally, the answer is "No." The representative of the health department then tries to persuade the complainant to speak to the neighbor and remind him that otherwise he must sign a written complaint and perhaps testify in court.

This procedure stops many complaints before it becomes necessary even to write a letter. When a condition cannot be remedied peacefully, an inspector checks the sanitation facilities of both parties. When conditions warrant, the owner receives a letter asking him to make certain corrections and giving him a reasonable amount of time in which to do so. If the corrections are not made within that time, a hearing before the county prosecutor is requested. If the hearing fails to bring results, the case is taken to court. Actually, not many cases reach that stage.



Coxsackie Virus Antibody and Incidence of Minor Illness During the Summer

By MARY WALTON, M.D., Dr.P.H., and JOSEPH L. MELNICK, Ph.D.

THE ROLE of Coxsackie viruses in human illness is not fully understood. The existence of 16 antigenic types of these agents with varying pathogenic potential for the mouse has suggested to some that we may actually be dealing with an assembly of agents loosely grouped together rather than with members of a single family (1-5). These agents have been isolated from patients with a variety of illnesses, and evidence has been presented for identifying certain members, for example, types A2 (Fleetwood) and A4 (Texas-1), as the etiological agents of herpangina (6) and others, for example, B1 (Conn.-5) and B3 (Nancy) as those of pleurodynia (epidemic myalgia, Bornholm disease) (7, 8). Although many of these agents have been isolated

from patients simultaneously infected with poliomyelitis virus, or from flies also carrying poliomyelitis virus, the role of the Coxsackie viruses in the etiology of the disease entity known as poliomyelitis remains obscure (1, 2, 3, 9, 10). The present study was undertaken to gain further information on this group of viruses and their possible relationship to minor illnesses of poorly defined nature which are commonly seen during the summer months.

The observations presented were made as a part of the study of poliomyelitis which is being conducted in Charleston, W. Va.

Laboratory studies of the development of poliomyelitis antibodies and measurement of the incidence of acute unclassified infectious illness have been undertaken in an attempt to define more accurately the epidemiology of poliomyelitis, the pattern of which is confused by the high ratio of mild or inapparent to apparent infections. The prevalence of the Coxsackie viruses and the confusion resulting from their epidemiological similarity to the poliomyelitis viruses led us to attempt to describe the incidence of infections with these agents and to investigate the association with the incidence of summer illness in children. The events which occurred during the summer of 1951 in Charleston are described.

The Study Areas

Relatively homogeneous population groups selected on the basis of certain characteristics of environment and socioeconomic status have

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This study and the accompanying one by Dr. Melnick, Dr. Walton, and Dr. Ira L. Myers (p. 1178) were aided by a grant from the National Foundation for Infantile Paralysis.

been under continuous observation since the spring of 1950. District I in Charleston is composed of approximately 900 persons in 200 households in the north central part of the city (fig. 1). In general, the environmental sanitation is poor. The area is not provided with sanitary sewers. The common method of disposal of human excrement is the insanitary privy. A small stream runs through the area receiving surface waste from overloaded cess-pools and septic tanks and wash from the privies. The fly-breeding potential is high. Economic status is generally low. Families are rather large, averaging 4.5 persons. Housing is substandard and crowded. There appears to be ready opportunity for spread of infectious agents by either ano-oral or respiratory routes. District IV is composed of about 1,300 persons in 420 families of middle to upper-middle socioeconomic status living in the southeastern part of the city. Environmental hygiene is standard. The fly-breeding potential is low. Average family size is 3.2 persons. Housing is adequate and not crowded. Personal hygiene practices are generally good.

Methods

Incidence of acute minor illness has been measured since the spring of 1950. Morbidity data are obtained from an adult informant in each household by trained lay interviewers at 4-week intervals. Informants are questioned as to the presence or absence in each member of the household of specific symptoms beginning in the 4 weeks preceding interview. Symptoms, duration, family diagnosis, and a measure of severity are recorded. Severity is measured by the amount of interference with usual activity and is classified as "no reduced activity," "reduced activity," and "in bed." A variable but always substantial portion of illnesses reported falls into the first category. Minor illnesses in the first two groups rarely come to the attention of physicians or health agencies, and thus would not be recorded by any of the usual reporting mechanisms. Incidence rates are, therefore, not comparable with rates obtained through ordinary channels. The schedule of enumeration is arranged so that comparable samples of each population are interviewed each week. The enumerators are regularly rotated

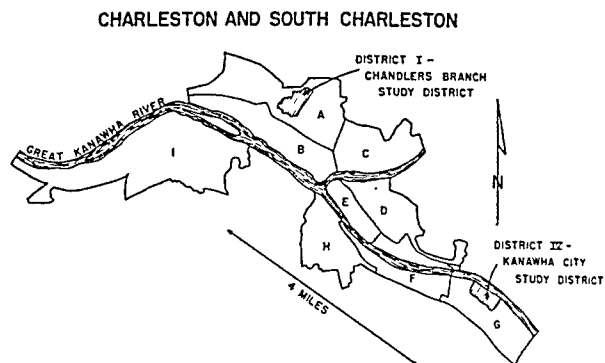


Figure 1. Location of the study areas.

to avoid bias which may result from differences between interviewers.

Laboratory data consist of measurements of complement-fixing (C-F) antibodies to each of four antigenically distinct Cocksackie viruses in paired serums collected in May and November of 1951 from the population under observation in the two districts. The method used for demonstrating antibody has been described (12). A "positive" serum is one reacting at a dilution of 1:4 or greater. A "negative" serum is one which fails to react at a dilution of 1:4. Antibodies to the following virus types were studied: B1 (Connecticut-5), B3 (Nancy), A4 (Texas-1), and A2 (Fleetwood). The classification of Cocksackie viruses has been discussed recently with a comparison of nomenclature used by Dalldorf (3), Huebner (4), and by one of us (5). A rise in C-F antibody is regarded as evidence of relatively recent infection with a Cocksackie virus (12, 13, 16). Even though there are at least 16 immunologically distinct Cocksackie viruses (5), there is evidence of crossing between them in the complement fixation reaction, so that in individual cases antibody rises to types other than the one isolated have been demonstrated (12, 13). The average time of persistence of detectable levels of C-F antibody after infection is not certain but it is known to be variable. It may persist for a year or more; on the other hand it is possible that sometimes it may be of such short duration that a rise could have occurred in some of these individuals and could have disappeared between the spring and fall bleedings (12, 13, 16).

Grab samples of sewage were collected to provide an index of Cocksackie virus infection in the community. Samples were obtained regu-

Table 1. Prevalence of C-F antibody to four types of Coxsackie virus. Paired serums from age samples of two study districts in Charleston, W. Va., 1951

Age	District I																
	Number of persons	Conn.-5 (type B1)				Type A2				Texas-1 (type A4)				Nancy (type B3)			
		Number positive		Percent positive		Number positive		Percent positive		Number positive		Percent positive		Number positive		Percent positive	
		Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1-4.....	22	6	19	27	86	3	16	14	73	5	8	23	36	4	6	18	27
5-9.....	32	19	30	59	94	7	16	22	50	17	17	53	53	13	11	41	34
10-14.....	9	8	8	89	89	1	3	11	33	6	3	67	33	3	2	33	22
Total 1-14.....	63	33	57	53	91	11	35	17	56	28	28	44	44	20	19	32	30
15+.....	20	12	13	60	65	2	4	10	19	3	4	14	19	10	6	50	30
District IV																	
1-4.....	28	3	10	11	36	7	9	25	32	3	10	11	36	2	2	7	7
5-9.....	56	24	30	43	54	17	23	30	41	33	32	60	58	11	5	20	9
10-14.....	20	6	6	30	30	3	7	15	35	14	9	70	45	6	2	30	10
Total 1-14.....	104	33	46	32	44	27	39	26	37	50	51	49	49	19	9	18	9
15+.....	42	30	23	71	55	4	9	10	22	16	13	38	31	24	11	57	26

¹ One Texas pair incomplete.

larly every 2 weeks during the winter months, and weekly, beginning in May, from lines serving the population of district IV and other residential areas in Charleston and two adjacent towns in the metropolitan area. Weekly privy samples were collected in district I beginning in May. The sewage specimens from each area were run in two pools per month. Privy specimens were run in two pools per month from each of four sections of district I. A description of the methods of collection and of testing these samples will be presented elsewhere.

Results

Table 1 and figure 2 show the prevalence of C-F antibody to the four types of Coxsackie virus in the spring and fall of 1951 in the populations in the two study districts. Only paired

specimens are included. Curves are a result of both conversion and reversion between spring and fall. Many individuals developed antibody to more than one type (table 2). It will be noted that in both districts the prevalence of C-F antibody to three types of virus rose during the summer while antibody to the fourth type, Nancy, was less prevalent in the fall than in the spring. No person developed antibody to Nancy alone. The age pattern for each type was different, both in spring prevalence and in change in prevalence between spring and fall.

Table 3 shows rates of conversion from negative to positive during the summer for each type. In both districts, the rate was highest for the Connecticut-5 type. The rate of development of antibody to both Connecticut-5 and type A2 was substantially higher in district I than in district IV. If conversion rate is an

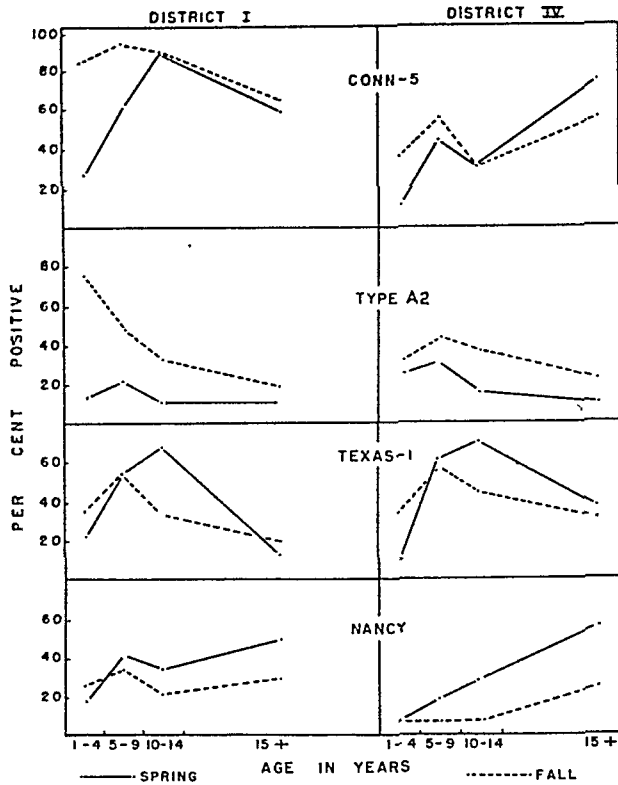


Figure 2. Age distribution of C-F antibodies to four Cocksackie viruses.

indication of extent of spread, then during the summer of 1951 Cocksackie virus spread much more extensively in district I than in district IV. Similar observations have been reported on development of C-F antibodies to the Texas-1 type virus in an urban population during the summer months and its relationship to socioeconomic status and environment (14).

The association between the development of C-F antibody, or conversion, and reported morbidity in individuals and households was investigated. In district I the conversion rate was so high that it is not possible to observe any association between morbidity and indication of the presence of infection with one or more types of Cocksackie virus during the summer period. There were only three households in which no pair of serums became positive to one of the Cocksackie viruses. Households with no conversion in Cocksackie virus antibody had no member with a negative complement fixation to Connecticut-5 in the spring. Only 1 child under 10 years of age had no C-F antibody in the spring or fall to any of the 4 types.

In district IV, the presence of households in which no individual tested developed antibody

Table 2. Number of positive C-F antibodies per person in spring and number of conversions per person during summer, 1951

Age	Num- ber tested	District I													
		Number of positive C-F tests per person in spring					Total number with 1 or more positive C-F tests		Number of new C-F anti- bodies per person during summer and fall				Total with 1 or more conversions		
		0	1	2	3	4	Num- ber	Per- cent	1	2	3	4	Num- ber	Per- cent ¹	
1-4-----	22	10	8	3	0	1	12	55	4	7	6	0	17	81	
5-9-----	32	7	9	6	5	5	25	78	5	5	4	1	15	56	
10-14-----	9	1	2	3	2	1	8	89	1	1	0	0	2	25	
15+-----	20	6	5	5	4	0	14	70	2	3	0	0	5	25	
District IV															
1-4-----	29	21	4	2	1	1	8	28	10	3	1	0	14	50	
5-9-----	56	8	24	12	11	1	48	86	12	3	1	0	16	29	
10-14-----	20	2	10	5	3	0	18	90	5	1	0	0	6	30	
15+-----	44	8	9	15	9	3	36	82	8	0	0	1	9	22	

¹ Percent of persons with one or more negative C-F tests in spring.

Table 3. Rate of development of C-F antibodies to four Coxsackie viruses in paired serums from a sample of the population in two study districts in Charleston, W. Va., 1951

Age	District I											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)
1-4.....	16	14	87	19	13	68	17	4	24	18	5	28
5-9.....	13	11	85	25	11	44	15	4	27	19	5	26
10-14.....	1	1	100	8	2	25	3	0	0	6	0	0
Total 1-14.....	30	26	87	52	26	50	35	8	23	43	10	23
15+.....	8	3	37	19	2	10	18	2	11	10	1	10
	District IV											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)
1-4.....	25	8	32	21	3	14	25	7	28	26	1	4
5-9.....	32	10	31	39	7	18	22	3	14	45	1	2
10-14.....	14	3	21	17	4	24	6	0	0	14	0	0
Total 1-14.....	71	21	30	77	14	18	53	10	19	85	2	2
15+.....	12	2	17	37	6	16	26	3	12	18	1	6

Rate of loss of C-F antibodies

Age	District I											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)
1-14.....	33	2	6	11	2	18	28	7	25	20	11	55
15+.....	12	2	17	2	0	0	3	1	33	10	4	40
	District IV											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)
1-14.....	33	7	21	27	2	7	50	9	18	19	12	63
15+.....	30	9	30	4	1	25	16	6	37	24	14	58

Table 4. Reported incidence of total unclassified acute minor illness in children under 10 years of age

Month	Households with conversions ¹			Households without conversions ²		
	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)
May.....	42	8	19	39	14	36
June.....	41	5	12	36	3	8
July.....	36	9	25	30	7	23
August.....	38	19	50	32	12	38
September.....	43	14	33	39	12	31
October.....	43	27	63	38	10	26

¹ Children in 21 households in which 1 or more persons under 10 developed C-F antibody between May and November 1951.

² Children in 25 households in which no person showed rise in C-F antibody.

NOTE: All populations are average number of children present per week during the month.

permits a comparison of minor morbidity between individuals and groups who did and did not show a rise in C-F antibody to one or more of the types of Coxsackie virus tested during that season. Households in which paired serums showed rises to type 2 poliomyelitis virus

have been excluded. Since infection with a Coxsackie virus spreads in households (1, 2, 6, 10, 11, 15), the association between evidence of infection in households and incidence of illness was investigated. Table 4 shows the total incidence by month of onset of acute minor illness in children under 10 years of age in households in which one or more persons, including at least one child under 10, developed antibody to one or more of three types of Coxsackie virus compared with the morbidity reported in children in households in which serum pairs were tested for children under 10 and no development of antibody was demonstrated. Only unclassified acute minor illness has been included. The common acute communicable diseases of childhood, chickenpox, measles, and mumps, and such conditions as summer sores, impetigo, poison ivy, pinkeye, reactions to immunizations, accidents, and injuries have been excluded. The peak of summer morbidity was in August. Rates in July and September were slightly higher than those in May and June. Incidence of total minor morbidity was also high in October in children in converter households. August incidence appeared to be slightly higher in converter households but differences between the two groups were not notable.

Table 5 shows the symptoms reported in the children with an unclassified acute minor ill-

Table 5. Individual symptoms reported in August 1951 by children under 10

Type of household	Number of children	Number of illnesses	Symptoms															Severity				
			Nasal	Cough	Sore throat	Fever	Headache	General aches	Stiff neck	Pains in arms-legs	Vomiting	Diarrhea	Other	Number of symptoms	Average symptom per illness	Fever rate, percent	Sore throat rate, percent	Vomiting rate, percent	Headache rate, percent	Usual activity	Reduced activity	In bed
With conversions.....	38	19	12	7	6	13	4	0	0	0	6	4	6	58	3.0	34	16	16	10	9	3	7
With no conversions.....	32	12	7	3	1	2	3	0	0	0	1	1	3	20	1.7	6	3	3	9	6	3	3

Table 6. Illnesses with fever or sore throat reported July–October 1951 in individual children with a rise in antibody to a Coxsackie virus

	1–5 years				6–14 years			
	Conn.-5 only	Conn.-5 + Texas-1 or type A2	Texas-1 only	Total	Conn.-5 only	Conn.-5 + Texas-1 or type 2	Type A2 only	Total
Number of children.....	6	3	5	14	5	3	6	14
Number with fever or sore throat....	6	2	5	13	2	0	0	2
Fever.....	5	2	5	12	1	0	0	1
Sore throat.....	3	1	2	6	1	—	—	1
Usual activity.....	1	—	—	1	2	—	—	2
Reduced activity.....	1	1	2	4	—	—	—	—
In bed.....	4	1	3	8	—	—	—	—
Month of onset:								
July.....	—	—	2	2	—	—	—	—
August.....	4	1	2	7	2	—	—	2
September.....	2	1	—	3	—	—	—	—
October.....	—	—	1	1	—	—	—	—

¹ Children who showed rises in C-F antibody to type 2 poliomyelitis virus have been excluded from both groups.

ness during the peak month of August. The symptoms listed are those regarding which specific questions were asked. Other symptoms included earache, upset stomach, and additional respiratory symptoms. There was no report of chest or pleuritic pain. A significant excess of fever was reported by children in households with conversions. Sore throat and vomiting were also present in some excess in this group. In one block in district IV, not included in the spring serum collection, type A2 Coxsackie virus was isolated in July from each of six children tested during a study of a localized excess of acute minor illness. Five of the six tested plus one household contact reported sore throat and fever. This experience is described in the accompanying report.

A summary of acute minor illnesses reported in individual children who developed antibody is shown in table 6. The children have been separated into two age groups, and illnesses are listed by type of Coxsackie virus to which C-F antibody developed. Five children, 1 to 3 years of age, developed antibody to Texas-1 only. All reported febrile illness during the interval between bleedings, 2 in July, 2 in August, and 1 in October. All were too sick for normal ac-

tivity and 3 were in bed. Two reported sore throat, 1 vomiting, and 1, the 3-year-old, complained of headache. Six children, 5 to 12 years of age, developed antibody to type A2 only. In this group no fever or sore throat was reported. Three had attacks of vomiting in October. Among the individual children 1 through 5 years of age showing a rise in C-F antibody to the Connecticut-5 virus, 7 out of 9 had a febrile illness in August or September, 4 had sore throat, 4 reported vomiting, and 3 headache. Classified by severity, one of the illnesses caused no reduction in the child's activity, two produced reduced activity, and 5 of the children were in bed. Of 8 children 6 to 14 years of age showing a rise in antibody to the Connecticut-5 virus, 1 reported sore throat and another reported fever. It is interesting to note that 13 of the 14 children of ages 1 through 5 had fever, sore throat, or both; only 1 of the 14 in the older group reported fever and 1 complained of sore throat.

Table 7 shows the number of illnesses in the children in each group of households in which fever or sore throat was reported as symptoms. There were 22 such illnesses in the children in households with conversions (average popula-

Table 7. Incidence in 1951 of unclassified acute minor illness with fever or sore throat in children under 10

Month	Households with conversions			Households without conversions		
	Number	Cases	Rate (per-cent)	Number	Cases	Rate (per-cent)
May.....	42	2	5	39	5	13
June.....	41	2	5	36	0	0
July.....	36	4	11	30	2	7
August.....	38	14	37	32	2	6
September.....	43	8	19	39	1	3
October.....	43	7	16	38	2	5

tion, 41) in August and September while among those in households with no conversions (average weekly population, 35) only 3 were noted. The rates for May, June, and July are similar in the two groups. In October, the difference is within chance range. The weekly incidence of illness with sore throat or fever in each group of children is shown in figure 3. Such illnesses in the children in households with antibody rise appear to be concentrated in the latter part of August (calendar weeks 33-35). There is also a little concentration in weeks 28-31, the period during which the block outbreak described in the accompanying paper occurred. As also shown in figure 3, Coxsackie virus was isolated from the sewage from District IV in the latter part of July and again in the first half of September. Pools of August collections were negative. Sewage from other areas in the community was positive intermittently from the first half of July until mid-October.

The average population under 10 years of age in district IV was about 380 during July and August. The total incidence of acute minor illness reported during this midsummer period, excluding accidents and injuries, was 28 per 100 in July and 37 per 100 in August. About 6 cases per 100 in each month were identified as mumps, impetigo, pinkeye, or other miscellaneous entities. The remainder fell into an unclassified group. The monthly

incidence of total unidentified illness and of those illnesses in which fever or sore throat was reported are shown in tables 8 and 9, compared with reported morbidity in the children in "conversion" and "no conversion" households. Rates for July are similar for the three groups. In August the children in households in which one or more developed C-F antibody reported a higher incidence of unclassified acute minor morbidity than did the whole population, especially of illnesses with fever or sore throat. These children, about 10 percent of the total population, accounted for nearly 25 percent of the total fever and sore throat incidence.

Discussion

The development of the C-F test for detection of antibody to the Coxsackie viruses has made available a tool which can be used to measure infection with these viruses in population groups. The test has the advantage of being relatively inexpensive, so that large scale observations are feasible. It lacks type specificity, however, to the point that in individual cases the type of the infecting virus cannot be determined. In spite of this limitation, the use of this technique may be of value in indicating broad epidemiological patterns of infection with this group of viruses. Combined with limited use of more specific but costlier methods of virus isolation and typing and studies of neutralizing antibody, it may permit adequate studies of the epidemiological and clinical characteristics of infection. The data presented here indicate both the usefulness and the limitations of the method.

Index of Incidence of Infection

The prevalence of Coxsackie C-F antibody in population groups should be an index of the incidence of infection during the period of average persistence of the antibody (14). The observations show that Coxsackie infection was common in Charleston prior to the first serum collection. In each district over 70 percent of persons tested had C-F antibody in the spring to one or more of the four types studied (table 2). The prevalence of antibody was not sig-

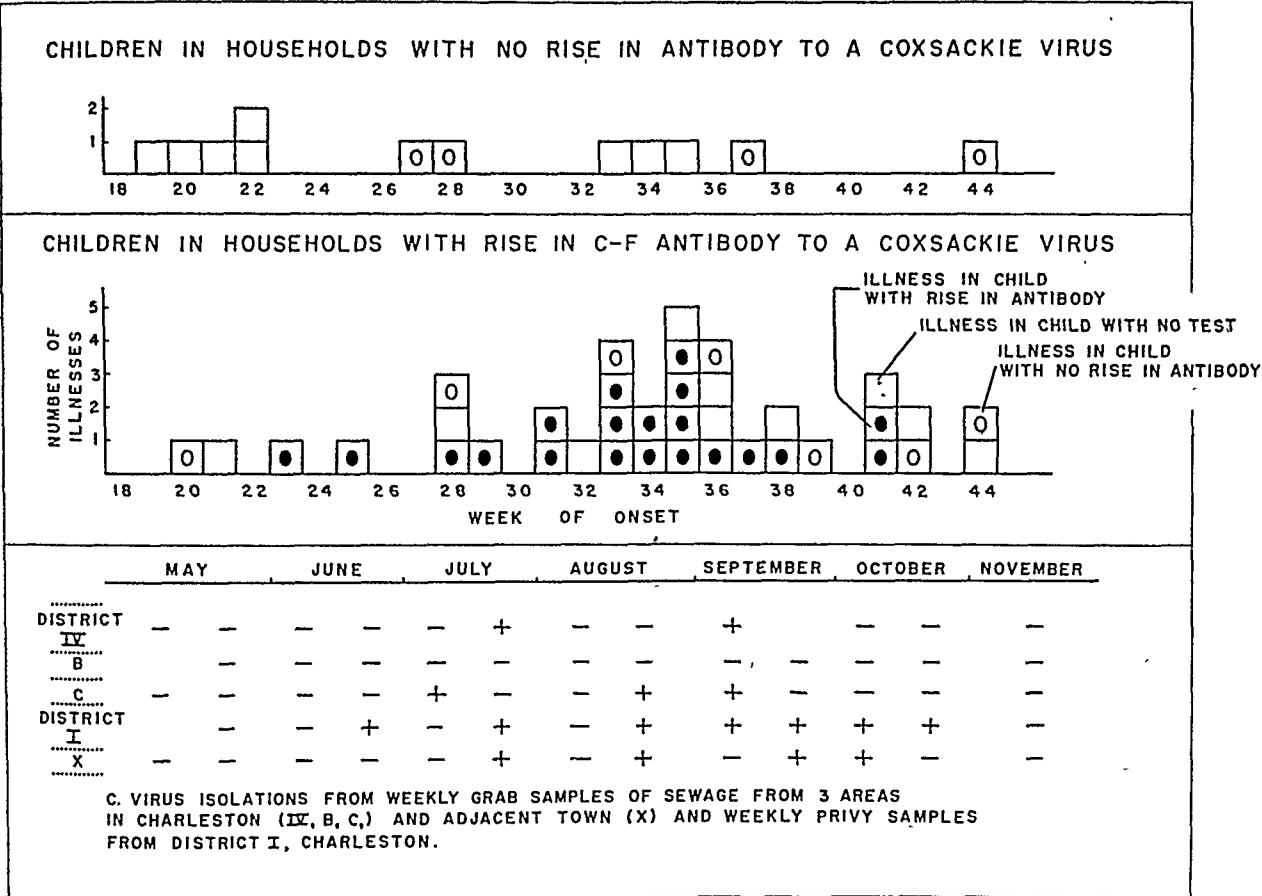


Figure 3. Weekly incidence of illness with sore throat and/or fever in households, and seasonal distribution of Coxsackie viruses in the area.

nificantly different in age groups over 4 years in either district or between the two population groups. Children 4 years of age or under in district I, the insanitary area, had C-F antibody to one or more of the viruses in somewhat higher prevalence (55 percent) than those in district IV (28 percent), an area with standard environmental hygiene. Prevalence of antibody tended to increase with age to about 14 years, after which the level remained essentially the same. It appears that infection was still taking place in the adult population. Since the average time of persistence of C-F antibody after infection is not known, and the picture is complicated by heterotypic responses, yearly incidence rates cannot be estimated. Even if detectable antibody persists longer than a year, incidence of infections with this group of agents must have been high at all ages.

Incidence of infection with a Coxsackie virus during the summer of 1951 was estimated by

study of C-F antibody to four types of virus in paired serums collected in May and November. Conversion from negative to positive is considered to be evidence of infection occurring in the interval between serum collections. Sixty-seven percent of children under 10 years of age in district I and 36 percent of children of the same age in district IV developed C-F antibody to one or more of the types studied. Conversion rates in persons age 10 and older was 25 percent in both district I and district IV. In children under 10 in district IV, 22 (73 percent) of 30 conversions were to a single type; 6 children developed antibody to 2 types and 2 children to 3 types. In district I only 9 (28 percent) of 32 conversions were to 1 type. Twelve children (38 percent) developed antibodies to 2 types, 10 to 3 types, and 1 to all 4 types. It is known that in response to infection with a 1 type of Coxsackie virus, rises in C-F antibody may occur not only to the infecting

type but also to heterologous types (12, 13, 16). The mechanism responsible for rise in heterologous antibody is not known, but it has been suggested that it may be an indication of previous infection with the type involved. This explanation could account for the greater degree of multiple rise in district I where spread of infection appeared to be more extensive.

In spite of the frequency of development of more than one antibody, the patterns of change in prevalence between spring and fall were different for each type studied. One type, Nancy, decreased in prevalence, with no rise to this type alone and reversion of over half of the spring positives to negative. It is reasonable to conclude that this type was not prevalent in Charleston during the summer of 1951. Increase in C-F antibody prevalence to a second type, Texas-1, was limited to the population under 5 years of age. Single rises occurred only in children of ages 1 to 3 in district IV and 1 adult in district I. No child under 4 in district IV and only 1 in district I had C-F antibody to Texas-1 in the spring. The conversion rate was highest in antibody to Connecticut-5 virus and occurred almost entirely in children under 15 years of age. Type A2 antibody prevalence was lowest in the spring and increased in all ages during the summer.

Whether or not one or more of the three viruses which showed increased antibody prevalence was causing infection during the summer cannot be determined from the C-F evidence. Coxsackie viruses were isolated from the sewage from both districts and from other areas in and around Charleston, but these strains have not been typed. Type A2 virus was isolated from stool specimens of 6 children with fever and sore throat and 2 household contacts in a block

in district IV which was not included in the serum collections. However, in the two study districts, children with paired serums tested showed a higher rate of development of C-F antibody to Connecticut-5 than to type A2, and single rises to both Connecticut-5 and Texas-1 occurred with no evidence of development of antibody to type A2. It is likely that at least 1 type in addition to type A2 contributed to the Charleston incidence, but whether or not either Connecticut-5 or Texas-1 were present is not known.

Morbidity and Coxsackie Viruses

The children in district IV who developed C-F antibody to one or more of the Coxsackie viruses studied and their household contacts reported more febrile illness and sore throat than were observed in households in which paired serums showed no rise in antibody. This excess in morbidity was most notable in August and September. The clinical syndrome in about half of the cases was similar to herpangina (6). The others were less specific. No chest pain or pleurodynia was reported. Seven of the 14 cases in individuals with conversion were associated with rise in antibody to the Connecticut-5 type only, and 4 with rise in Connecticut-5 plus either Texas-1 or type A2. Similarly, 4 of the 9 household contact cases were associated with rise to Connecticut-5 only and 3 with rises to Connecticut-5 plus Texas-1 or type A2. Since virus was not isolated from any of these individuals at the time of illness, it is not possible to say positively that any type of Coxsackie virus was responsible for the illnesses or the development of C-F antibody. It is interesting, however, and perhaps worthy of further investigation, that while the greatest

Table 8. Incidence of unclassified acute minor illness in children under 10 years of age, District IV, 1951

Month	All children			Households with conversions			Households without conversions		
	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)
July.....	373	79	21	36	9	25	30	7	23
August.....	388	119	31	38	19	50	32	12	37

Table 9. Incidence of unclassified acute minor illness with symptoms of fever or sore throat, District IV, 1951

Month	All children			Households with conversions			Households without conversions		
	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)
July-----	373	39	10	36	4	11	30	2	7
August-----	388	61	16	38	14	37	32	3	9

number of antibody conversions were to the Connecticut-5 virus, and the association of conversion to Connecticut-5 with minor morbidity was most marked, the minor illnesses reported were herpangina-like. The Connecticut-5 virus has been suggested as one of the etiological agents of pleurodynia (7, 8). No symptoms suggestive of this syndrome were reported.

Summary and Conclusions

1. Spring and fall prevalence of complement-fixing antibodies to four antigenically distinct Cocksackie viruses in paired serums collected in the spring and fall of 1951 from two selected population groups in Charleston, W. Va., is presented with conversion rates for each age group. Each population is relatively homogeneous, but the two differ in socioeconomic status and environmental sanitation. Antibodies to the following Cocksackie virus types were studied: Connecticut-5 (B1), Nancy (B3), Texas-1 (A4), and type A2.

2. In spite of the fact that many persons showed development of antibody to more than one type of virus, each type shows a distinct and different pattern of change in prevalence between spring and fall.

3. The conversion rate for the two types which showed increase in prevalence at all ages was definitely greater in the district characterized by substandard socioeconomic status and environment.

4. In the district selected for good sanitary environment and better than average socioeconomic status, there appeared to be an association between the development of antibody to one or more of the Cocksackie viruses and the re-

ported incidence of unclassified acute minor morbidity, particularly those illnesses with symptoms of fever or sore throat in individuals and family contacts under 10 years of age.

5. The incidence of unclassified acute minor illnesses in the total population under 10 years of age in this district during August was about 31 cases per hundred. Ten percent of the children, identified by laboratory study as individuals or household contacts of individuals who developed complement-fixing antibody to one of the Cocksackie viruses, reported incidence rates higher than the rates for the total population and accounted for about 25 percent of the morbidity with symptoms of fever or sore throat.

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Isolation of a Cocksackie Virus During a Summer Outbreak Of Acute Minor Illness

By JOSEPH L. MELNICK, Ph.D.,
MARY WALTON, M.D., Dr.P.H.,
and IRA L. MYERS, M.D.

COCKSACKIE VIRUSES have been isolated from patients with a variety of illnesses (1, 2, 3). However, the characterization of these viruses as the etiological agents of specific disease is not a simple matter. Extensive and detailed investigations were required before Huebner and his associates (4) were able to demonstrate that certain members of the Cocksackie group could induce the clinical entity known as herpangina. The fact that at least 16 antigenic types are included in the Cocksackie group (5) confuses the problem. Additional investigations combining epidemiological observations and laboratory study of specimens collected in the field are necessary to elucidate the role of these viruses in human illnesses. One such investigation is recorded here.

The observations described were made as a part of a study of the epidemiology of poliomyelitis which is being conducted in Charleston, W. Va. (See the preceding paper.) In the last week of July 1951 an unusual incidence of unclassified acute minor illness was noted in a block in one of the study areas in which households are regularly visited by in-

Dr. Myers, a commissioned officer of the Public Health Service, was assigned to the Communicable Disease Center poliomyelitis project, at Charleston, W. Va., when a part of this study was in progress. He is now with the Communicable Disease Center, Atlanta, Ga. Biographical data for Dr. Melnick and Dr. Walton will be found with the article by them on p. 1167 of this issue.

This study was aided by a grant from the National Foundation for Infantile Paralysis.

interviewers. The block is adjacent to one from which a case of poliomyelitis had been reported earlier in the week. The situation was investigated to determine whether or not the two observations were related.

Materials and Methods

Stools and paired serum samples were collected at times indicated in table 1. They were frozen at about -20°C . soon after collection and held at this temperature until tested. The methods used in the preparation of stools for testing for poliomyelitis and Coxsackie viruses, as well as the criteria for positive isolations, have been described in detail previously (6, 7, 8). For poliomyelitis virus one monkey was employed per sample, the animal being inoculated intracerebrally with a fecal extract which had been concentrated and partially purified by ultracentrifugation. Two litters of eight newborn mice each were inoculated for each test for Coxsackie virus.

Neutralization tests were carried out as described (9, 10). For the paired serums, each serum was diluted 1 to 10 and run against varying dilutions of virus. The results in table 1 are listed as the log units of type A2 Coxsackie virus (Fleetwood strain) neutralized by this dilution of serum.

The viruses isolated in this study were typed first by the plate complement fixation test as adapted to Coxsackie viruses (11) and then by neutralization with the prototype serum in order to rule out the presence of more than one strain in the isolate (5).

The Outbreak

The poliomyelitis patient, a white male 6 years of age in household 8 (see table 1) became ill on July 18, 1951, with symptoms of fever, drowsiness, nausea, and epigastric pain. He developed a stiff neck the following day. A diagnosis of poliomyelitis was made on July 20 on the basis of increased lymphocytes in the spinal fluid, stiff neck, and hamstring muscle spasm. Weakness of abdominal muscles was noted on July 21 and persisted until September 4. On July 21 his year-old brother developed fever and sore throat, at which time the attend-

ing pediatrician observed small vesicles in the throat (herpangina). On July 25 his mother reported a sore throat.

The 6-year-old poliomyelitis case played frequently with children in the adjacent study block and had attended a birthday party at the home of household 2 (see table 1) on July 4. There was no known contact with household 7.

Twelve families live in the study block. Seven were available for study. In 6 households 1 or more persons reported illness during July. Of the 10 children in these households 7 had symptoms between July 11 and 31. Six had fever and sore throat. In 2, small vesicles were seen on the first or second day of illness. The others had small superficial ulcers. The seventh reported only coryza. Morbidity reported in the block and laboratory findings are shown in table 1.

Laboratory Findings

Coxsackie virus was isolated from stools of each of six children in the study block and from the poliomyelitis patient and the younger child in that household (No. 8). By methods previously described (5) all eight strains were found to belong to type A2. The Charleston viruses reacted in the complement fixation test with type A2 serum but not with any of the other 14 prototype serums which were run simultaneously with each of the strains. Each strain was then found to be neutralized by antiserum to the prototype type A2 strain (Fleetwood). Over 100,000 doses of virus were neutralized by a 1 to 10 dilution of immune mouse serum.

One of four children from whom paired blood specimens were obtained showed a rise in titer of neutralizing antibody. No virus was isolated from stools of six adults in households with illness. All first blood specimens from the adults showed neutralizing antibody. None showed a rise in titer in convalescent blood.

Household 7 reported no illness during July. There was no known contact between children in this family and others in the block. No virus was isolated from stool specimens of 2 children and 2 adults in this family.

Poliomyelitis virus was isolated from a stool specimen from the poliomyelitis patient but not from the specimens of the sibling or from the

Table 1. Summary of morbidity and laboratory findings among certain householders in Charleston, W. Va., 1951

Household No.	Sex	Age	Symptoms		Serum				Stools		
			Date	Kind	Dates		Log of type A2 neutralization index		Date	Virus isolated	
					1st	2d	1st	2d		Type A2 Coxsackie	Polio-myelitis
1	M	30	6/23	Sore throat, fever, headache							
	F	28	7/24	Vomiting, diarrhea	7/27	9/6	4.8	4.8	8/8	0	
	F	5									
	M	3	7/11	Sore throat, fever					8/8	+	0
2	M	37									
	F	35			8/1	9/8	4.3	3.8	8/13	0	
	M	6	7/16	Sore throat, ¹ fever ²	7/27	9/8	5.3	5.3	8/13	+	0
	M	1	7/16	Sore throat, fever					8/13	+	0
3	M	37									
	F	34	7/25	Stiff neck ³	8/1	9/6	4.3	3.8	8/13	0	
	F	8	7/29	Sore throat, fever, cough ⁴					8/13	Inc.	
	M	5	7/31	Running nose	8/1	9/6	5.3	5.5	8/13	+	0
4	M	33									
	F	33	7/24	Sore throat					8/8	0	
	M	4									
	M	2									
5	M	33									
	F	33			8/1	9/8	3.0	2.8	8/8	0	
	M	5	7/22	Sore throat, ¹ fever	8/1	9/8	5.0	5.8	8/8	+	0
	M	2	7/25	Sore throat, fever	8/1	9/8	1.3	>6.3	8/8	+	0
6	M	33									
	F	24									
	F	20	7/19	Headache, cough					8/8	0	
7	F	73							8/9	0	
	M	37									
	F	35			8/1	9/11	4.3	4.3	8/9	0	
	F	10			8/1	9/11	4.3	4.3	8/9	0	
	F	4							8/9	0	
8	M	34							8/8	0	
	F	27	7/25	Sore throat	7/27	9/6	1.8	2.5	8/8	0	
	M	6	7/18	Fever, drowsy, stiff neck, nausea ⁵	7/24	9/4	4.3	>6.3	7/24	+	+
	M	1	7/21	Sore throat, ¹ fever					8/8	+	0

¹ "Blisters in throat."

² Additional onset 7/21—fever, vomiting.

³ Additional onset 8/9—fever, stiff neck, chest and eyes ached, diarrhea.

⁴ Chest and eyes ached.

⁵ Poliomyelitis case—additional symptoms: diarrhea, epigastric pain.

children in the study block. None of three pairs of serum run showed a rise in complement-fixing antibody to type A2 poliomyelitis virus.

Discussion

An investigation was made of an outbreak of minor illness which occurred coincidentally with the onset of poliomyelitis in a child during a period of low poliomyelitis incidence in Charleston, W. Va. Only three cases were reported in this area in 1951. The study was limited to one city block in which several cases of fever and sore throat (including some patients with herpangina) occurred during July 1951. Stool samples were collected as long as a month after symptoms were first noticed. If we assume that the illness was caused by type A2 Cocksackie virus, then the fact that every child tested who had been ill was found to be excreting this virus is an agreement with previous studies on the duration of Cocksackie virus carrier states. Because the first serum sample was usually taken several days after onset, it is not surprising that antibody rises could be demonstrated only in two instances. Neutralizing antibodies develop early in Cocksackie infections (6, 9), and all patients excreting Cocksackie viruses either had a high titer of homotypic antibodies in their first serums or developed them by the time the second serums were taken.

It is noteworthy that only one household with children gave negative tests for Cocksackie virus and that the children of this household had no known contact with the children of the other families studied.

In the group of five households with children currently infected, none of the adults were found to be carriers. All adults who were tested had neutralizing antibodies to type A2 Cocksackie virus. The titer of antibody in the adults did not change during the period of observation. It was slightly lower than that in the children, which suggests that the infection of the adults might not have been of recent origin. Beeman, Cole, and Huebner have recently made extensive studies in this field and have come to conclusions with which we agree: Persons with type specific neutralizing antibody do not excrete virus when it is introduced into the household, nor is there a change in their

neutralizing antibody level. Similar observations have been made on chimpanzees exposed to Cocksackie virus by natural routes (12).

There was little poliomyelitis in Charleston in 1951 and the data show how localized poliomyelitis can be in an urban area. The minor illness in the study area could not be related to poliomyelitis infection but rather to infection with one of the Cocksackie viruses. The patient who first called our attention to this area was found to be infected with both poliomyelitis and a Cocksackie virus. Although the contacts appeared sufficient for spread of Cocksackie virus within the block, no evidence could be obtained that poliomyelitis virus spread from the patient into the block. In 1950, which was also a year of low prevalence of clinical poliomyelitis, virological data also indicate the failure of the virus to spread widely through the community. Sewage tests were carried out in 1 circumscribed area of Charleston (4,000 people on the line) in which 2 cases occurred in 1 week during September. Weekly sewage samples were negative for 11 weeks before the cases occurred, and also during the week of onset. Poliomyelitis virus was isolated from the sewage the following week. After this, the tests became negative again.

Serological data on Cocksackie infections were obtained in Charleston during the summer of 1951 from normal children who were bled in the spring and again in the fall (see accompanying study). It was found that 30/83 (36 percent) of children under 10 years of age in this study area developed increases in complement-fixing antibodies to type A2 (Fleetwood), A4 (Texas-1), or B1 (Connecticut-5) viruses and to a much less degree (2/83) to B3 (Nancy). Of the 13 children with antibody to type B3 in the spring, 8 showed no antibody in the fall. Children developing Cocksackie virus antibodies had a significantly higher incidence of fever and sore throat than children who failed to develop these antibodies. Because of the heterotypic complement-fixing antibody response occurring in Cocksackie infections, it is not possible to say which virus was responsible for the antibody increases in the Charleston children. The isolation here of type A2 Cocksackie virus from children with similar illnesses during the same period sug-

gests that the type A2 virus may well have been one of the major etiological agents for the minor illnesses prevalent in Charleston during the summer of 1951.

Summary

A localized summer outbreak, presumably of herpangina, was investigated in Charleston, W. Va., during 1951.

Acute minor illnesses with symptoms of sore throat and fever were reported by the sibling of a case of poliomyelitis and by 6 of 10 playmate contacts under 10 years of age living in the block across the street. Some of the children had a syndrome compatible with herpangina. Both poliomyelitis virus and type A2 Coxsackie virus were isolated from a fecal specimen from the case of poliomyelitis, and a rise in neutralizing antibody titer to type A2 Coxsackie virus was demonstrated. Stool specimens from household and playmate contacts with symptoms were found to contain type A2 Coxsackie virus but not poliomyelitis virus. Adult members of the households possessed neutralizing antibodies to type A2 Coxsackie virus. None were found to be excreting virus.

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Research Preferences and Activities Of Public Health Service Officers

By SIDNEY H. NEWMAN, Ph.D., and MARGARET A. HOWELL, M.A.

PUBLIC HEALTH SERVICE professional personnel—commissioned officers and civil service—engage in four major types of health activities: research, clinical or medical care, administrative, and public health (for example, consultation on State health programs and developing disease control programs). Research activities are both basic and applied. They are performed in laboratory, field, or clinical situations and are concerned with such problems of health and disease as etiology, therapy, and control.

Achieving the best in-Service placement in the four areas of Service activity requires

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knowledge of employees' interests and training. In the research area, the need for readily available information on work preferences was recently highlighted by the staffing requirements of the newest research programs of the Public Health Service, those operating in the Clinical Research Center of the National Institutes of Health, in Bethesda, Md.

To meet this need among commissioned personnel, a questionnaire was designed to identify the officers interested in doing research and to determine their specific interests in defined areas of investigation. As an aid to administrators in making a quick initial screening of officers who might be assigned to research activities, the questionnaire also asked each officer to indicate his years of training and experience in research and other work areas. Background characteristics of those officers who, on the basis of questionnaire responses, appear adequately prepared for research positions could then be more completely evaluated from the records of training and experience contained in the personnel files of the Division of Commissioned Officers.

This report summarizes the salient findings from an analysis of the questionnaire responses, furnishing an overview of the research activity of the Public Health Service commissioned corps and identifying its research potential as indicated by expressed work preferences. The data may also be useful to individuals dealing with that phase of the Nation's manpower prob-

lems involving the identification and utilization of research personnel. Some attention is devoted to the methods for collecting and using the information in dealing with staffing problems since these methods could be extended to other organizations and other types of personnel activities.

Methods

The research interest questionnaires and instructions for their use were mailed in May 1952 to the 2,589 regular and reserve officers who were on active duty in the Public Health Service. Followup letters were sent a month later to officers who had not returned the forms. Of the questionnaires distributed, 2,278—88.0 percent—were included in the study; 298—11.5 percent—were not returned; and 13—0.5 percent—were returned too late to be included in the tabulations.

The questionnaire was of the self-coding type. It was designed so that it could be easily and quickly completed, would yield the complex information desired, and would furnish information that could be processed by machine tabulation methods.

Information from the questionnaires was disseminated to employers of officer research personnel in the Public Health Service through the compilation of three listings. The listings were arranged to answer the three major questions which these employers could be expected to ask: Who are the officers interested in doing research? On what disease or condition would each officer prefer to work? In what discipline or field is each officer most interested in working?

To answer the first question, officers were grouped according to their responses to the questionnaire—not interested in research, satisfied to do research, glad to do research, and preferring research to any other field. The second and third questions were answered by grouping officers according to their first research choices indicated from a list of 134 diseases or conditions and 197 disciplines or fields. Write-in first choices were listed separately. Within each of the 3 listings, officers' names were arranged first by profession, then by rank, and last, alphabetically within rank.

The prepared listings thus enable Service employers to locate rapidly individuals who might possibly fill research vacancies. By consulting the listing arranged by first choice of disease or condition, they can immediately locate the names of all officers in the Public Health Service who are interested in doing research on, for example, malignant neoplastic diseases. At the same time, they can see which officers have had sufficient training and experience to warrant further consideration by a review of their personnel files.

General Interest in Research

In considering the statistical results from the study, it is well to bear in mind that the data are based on officers' evaluations of their own training, research interests, and current activities. The generalizations which may be derived from an analysis of questionnaire responses could differ somewhat from those which might be made in other types of appraisals of current officer research potential and activities. Further, the current research interests reported by officers are not to be regarded as immutable. While it may be assumed that interests in broad occupational areas in the health field, such as medical care, public health, or research, will remain fairly constant, expressed specific interests may be influenced by such factors as an officer's present assignment or his estimation of future needs of the Public Health Service.

Where available, comparative percentages of other groups engaged in research are included in this report. Strict comparisons of the Public Health Service group with other groups cannot be made since conditions under which information was obtained were not necessarily the same and since Service officers could possibly constitute a part, though a small proportion, of some of the other groups. The comparative data, however, may be helpful in providing a frame of reference for the material in this report.

Research Potential

Summary data on officers' research interests and activities are presented in table 1. From this table, it may be seen that 27 percent of officers in the study report that they are cur-

rently engaged in research. Most of these, 24 percent of the total group, say that they are in research and like it. Only 3 percent of all the officers indicate that they are currently engaged in research and are not satisfied with their present type of assignment. Of the officers included in the study, 73 percent state that they are not in research assignments; 31 percent indicate that they are not in research assignments but would be satisfied or glad to do research. As measured in terms of expressed interest, this 31 percent represents the personnel research potential of the commissioned corps. If, then, new research vacancies occur, either because of expanding research activities

or because of transfer of officers in research to other activities, this group of 712 commissioned officers can be evaluated for research assignments.

The 42 percent who say they are not performing research and do not wish to do so may be eliminated from consideration for research activities. These officers are needed in the public health, medical care, and administrative functions in which they may be presumed to be interested.

Comparison of Categories

The categories with the highest proportion of officers reporting they are currently engaged in

Table 1. Officers' current¹ research activity and preference

Commissioned officer categories ²	Preferring research		Not preferring research		Total doing research	Total not doing research	Total pre-ferring research	Total not pre-ferring research	Total answering
	Doing	Not doing	Doing	Not doing					
	Number								
Scientist.....	112	24	1	4	113	28	136	5	141
Veterinarian.....	13	3	0	6	13	9	16	6	22
Sanitarian.....	75	49	2	71	77	120	124	73	197
Medical.....	244	382	27	475	271	857	626	502	1, 128
Sanitary engineer.....	54	88	6	104	60	192	142	110	252
Nurse.....	24	77	9	104	33	181	101	113	214
Dental.....	20	55	8	125	28	180	75	133	208
Dietitian.....	1	9	3	28	4	37	10	31	41
Pharmacy.....	4	20	1	33	5	53	24	34	58
Therapy ³	0	5	1	11	1	16	5	12	17
Total.....	547	712	58	961	605	1, 673	1, 259	1, 019	2, 278
	Percentage of category								Percent- age of total
Scientist.....	79. 4	17. 0	0. 7	2. 8	80. 1	19. 9	96. 5	3. 5	6. 2
Veterinarian.....	59. 1	13. 6	0	27. 3	59. 1	40. 9	72. 7	27. 3	1. 0
Sanitarian.....	38. 1	24. 9	1. 0	36. 0	39. 1	60. 9	62. 9	37. 1	8. 6
Medical.....	21. 6	33. 9	2. 4	42. 1	24. 0	76. 0	55. 5	44. 5	49. 5
Sanitary engineer.....	21. 4	34. 9	2. 4	41. 3	23. 8	76. 2	56. 3	43. 7	11. 1
Nurse.....	11. 2	36. 0	4. 2	48. 6	15. 4	84. 6	47. 2	52. 8	9. 4
Dental.....	9. 6	26. 4	3. 8	60. 1	13. 5	86. 5	36. 0	63. 9	9. 1
Dietitian.....	2. 4	22. 0	7. 3	68. 3	9. 8	90. 2	24. 4	75. 6	1. 8
Pharmacy.....	6. 9	34. 5	1. 7	56. 9	8. 6	91. 4	41. 4	58. 6	2. 5
Therapy ³	0	29. 4	5. 9	64. 7	5. 9	94. 1	29. 4	70. 6	. 7
Percentage of total number answering.....	24. 0	31. 3	2. 6	42. 2	26. 6	73. 4	55. 3	44. 7	100. 0

¹ At time of completing the questionnaire.

² There are 10 major categories of commissioned officers in the Public Health Service; 2 categories, scientist and sanitarian, are each subdivided into a number of professions.

³ Physical and occupational.

research are the categories of scientist—80 percent, veterinarian—59 percent, and sanitarian—39 percent (see table 1). The scientist and sanitarian categories of the Service are composed of a number of scientific professions (1). Because of the small numbers of officers in each profession in these two categories, percentages engaged in research are based on all professions within each category.

Of the scientific professions represented in the scientist and sanitarian categories of the Public Health Service, data are available on the research activity in certain of these professions in this country (2-4). With respect to the members of these professions who have the *doctorate*, as is required of scientists in the Service, 55 percent of the chemists, 42 percent of the physicists, and 12 percent of the psychologists report that they are engaged in research. With regard to professional groups in this country who have the degrees required for the sanitarian category—in this category the master's degree is required for commissioning in the Regular Corps and the bachelor's for the Reserve Corps—the following data on percentages engaged in research are available (2-4): chemists with the master's degree—49 percent, with the bachelor's degree—41 percent; physicists with the master's—44 percent, with the bachelor's—61 percent; psychologists with the master's—12 percent. (Psychologists with the bachelor's degree are usually not eligible for research positions.) In all degree levels, 51 percent of chemists in government and 71 percent of physicists in government report that they are engaged in research.

The 59 percent of veterinarian officers reporting research activity suggests that the work of Service veterinarians differs from that of other groups of veterinarians. An estimated 7 percent of the veterinarians in the United States are engaged in teaching and research, exclusive of the approximate 1 percent who are doing research in the Federal Government and in commercial organizations.

Of Service officers engaged in research, the medical (24 percent) and sanitary engineer (24 percent) categories contain the inbetween percentages. Medical officers engage in all four types of Service activities—research, medical care, public health, and administrative. Sani-

tary engineer officers engage in all except medical care. Data are not available on the research activity of physicians in this country. A greater percentage of Public Health Service sanitary engineers, however, state they are doing research than do sanitary engineers in general. Only 2 percent of the sanitary engineers in this country report that they are engaged in research (5).

Authoritative estimates are available on the percentages of all engineers and scientists combined who are engaged in research in this country. About 25 percent of engineers and scientists were in research in 1952, and about 35 percent of engineers and scientists in the Federal Government were engaged in research in 1951 (6). Keeping in mind the previously mentioned reservations concerning comparisons of Service and other groups, one may note that 42 percent of Service officers in the combined scientist, sanitarian, and sanitary engineer categories are engaged in research.

It is easy to understand why relatively small proportions of nurse (15 percent), dental (14 percent), dietitian (10 percent), pharmacy (9 percent), and therapy (6 percent) officers are engaged in research in the Public Health Service. Officers in these professions are usually employed for medical care, public health, and administrative assignments. Informed estimates are available on the percentages of some of these professions that are engaged in research in the United States. Presumably, these indicate that a higher proportion of Service officers in these professions engage in research than do members of these professions in general. Nurse researchers are as yet few in number. Approximately 1.5 percent of the members of the American Dietetic Association are doing full-time research. About 4 percent of the members of the American Pharmaceutical Association are actually engaged in research, and an estimated additional 1 percent are engaged in teaching and research.

Considering officers' preferences for research, it may be seen that the order of the percentages of officers within each category preferring research closely parallels that of the percentages within each category doing research (see table 1). There are large differences between categories in the proportion of officers preferring

research. As is to be expected, scientist officers are the most research-minded group: 97 percent prefer research. Next in order are the veterinarian, sanitarian, sanitary engineer, and medical officers.

Preferred Areas of Research

The specific areas in which research-interested officers would like to work were determined by asking officers to indicate their preferences for various kinds of research operation, such as laboratory or clinical, and for various disciplines or fields of study. Preferred areas of research are summarized in table 2 in which the 197 disciplines originally listed for use with the questionnaire have been grouped in 8 general fields.

Of the total number of officers interested in performing research, most show preference for these types of research operation: clinical in-

vestigation (20 percent), combined laboratory-clinical (16 percent), laboratory (16 percent), laboratory-field (12 percent), and field (12 percent). Relatively little interest is shown in such types of research as the combined field-clinical (6 percent), administrative (5 percent), and statistical surveys and analyses (2 percent).

The highest preferences by discipline are in the medical (43 percent), biological-medical (15 percent), engineering-sanitation (14 percent), and biological (12 percent) fields. The pattern of discipline preferences fits fairly closely that of preferences for operational areas. This is to be expected since many disciplines tend to fall into specific operational areas. As examples, research in the medical field is likely to be in a clinical area of operation, and biological-medical research is likely to be in a combined laboratory-clinical area.

Table 2. Commissioned officers (1,259) preferring ¹ to do research in various operational areas and in various disciplines

Research preference	Total group		Doing research		Not doing research	
	Number	Percent	Number	Percent	Number	Percent
<i>Operational area</i>						
Clinical.....	248	19.7	43	7.9	205	² 28.8
Laboratory-clinical.....	207	16.4	81	14.8	126	17.7
Laboratory.....	204	16.2	175	32.0	29	² 4.1
Laboratory-field.....	154	12.2	83	15.2	71	² 10.0
Field.....	147	11.7	52	9.5	95	² 13.3
Research-administration.....	112	8.9	52	9.5	60	8.4
Field-clinical.....	69	5.5	15	2.7	54	² 7.6
Administrative.....	66	5.2	31	5.7	35	4.9
Statistical surveys.....	22	1.8	6	1.1	16	2.2
Not stated.....	30	2.4	9	1.6	21	3.0
Total.....	1,259	100.0	547	100.0	712	100.0
<i>Discipline or field</i>						
Medical.....	544	43.2	155	28.3	389	² 54.6
Biological-medical.....	192	15.2	101	18.5	91	³ 12.8
Engineering-sanitation.....	179	14.2	70	12.8	109	15.3
Biological.....	149	11.8	101	18.5	48	² 6.7
Chemical.....	76	6.0	69	12.6	7	² 1.0
Physical.....	27	2.1	14	2.6	13	1.8
Social.....	19	1.5	9	1.6	10	1.4
Mathematical-statistical.....	5	.4	5	.9	0	0
Other.....	44	3.5	16	2.9	28	3.9
Not stated.....	24	1.9	7	1.3	17	2.4
Total.....	1,259	100.0	547	100.0	712	100.0

¹ First choice.

² Differences between those doing and not doing research are significant at the 1-percent level.

³ Differences between those doing and not doing research are significant at the 5-percent level.

Preferences of the research-interested officers who state that they are currently engaged in research are different from those of officers who are not in research. In areas of research operation, the former group definitely prefers laboratory research (32 percent), a combination of laboratory and field (15 percent), and laboratory and clinical combined (15 percent). Officers not doing research lean toward clinical investigations (29 percent). Combined laboratory-clinical (18 percent), field (13 percent), and combined laboratory-field (10 percent) are next in order of preference (see table 2).

In the discipline choices, research-interested officers not in research are significantly more interested in the medical field (55 percent) than are the officers doing and preferring research (28 percent). Significantly more of the latter group, those who perform and prefer research, however, show interest in the biological-medical, biological, and chemical fields. Preferences for the engineering-sanitation and remaining fields are fairly close for the two groups.

Preference differences of officers reporting that they are currently in research and those not in research may be partly accounted for by the fact that proportionately more scientist, sanitarian, and veterinarian officers who prefer research are engaged in it than are medical officers who prefer research. By reference again to table 1, one may see that of the 547 officers preferring and doing research, 200 (37 percent) are in the scientist, veterinarian, and sanitarian categories, and 244 (45 percent) are in the medical category. By contrast, of 712 officers preferring but not doing research, only 76 (11 percent) are in the first 3 categories, while 382 (54 percent) are in the medical category. It is not surprising, then, that a higher percentage of officers who are interested in research but are currently not engaged in this activity would like to work in the medical or clinical areas than would officers interested in and now doing research.

The preferences in disciplines and areas of research operation expressed by the total group of research-interested officers reflect to some extent the professional composition of the Public Health Service. If it is presumed that the

professional structure within the Service has developed from the activities and needs of the Service, then it is not surprising that the expressed preferences of the group studied fit well the present and anticipated work of the organization. In the past, laboratory, combined laboratory-field, and laboratory-clinical types of studies have tended to receive emphasis. With the opening of the Clinical Research Center in July 1953, an increase in the clinical type of investigation and more opportunity for integrated laboratory-clinical work can be expected.

Preferred Research Problems

One part of the questionnaire asked officers interested in research to describe in narrative form the kind of research problem on which they would like to work. These descriptions are available to Service employers of research personnel. In addition, more general information on preferred research problems was obtained from the choices that the officers indicated for diseases or conditions on which they would like to do research. The disease research preferences for those officers expressing interest in doing research are shown in table 3. For the table, the list of 134 diseases or conditions used with the questionnaire has been divided into 19 general groups based on a modification of a standard classificatory system (7).

A comparison of the preferences indicates that proportionately more officers not doing research than those in research prefer to work on problems dealing with psychological disorders, diseases or conditions of the respiratory system, and organs of special sense. A greater proportion of those indicating that they are in research than of those not in research would like to investigate infections by lower organisms, infections by higher plants or animal parasites, and disorders of metabolism, growth, or nutrition. Generally, however, there is good agreement between the disease work preferences of the two groups of officers.

The 1,259 officers interested in research prefer to work on the following diseases or conditions as classified in table 3: vectorborne diseases (13 percent), infection by lower organism (11 percent), psychological disorders (9 percent), car-

Table 3. Commissioned officers (1,259) preferring ¹ to do research on various diseases and conditions

Diseases or conditions ²	Total group		Doing research		Not doing research	
	Number	Percent	Number	Percent	Number	Percent
Vectorborne diseases, general-----	165	13.1	80	14.6	85	11.9
Infection by lower organism ³ -----	136	10.8	76	13.9	60	⁴ 8.4
Psychological disorders-----	108	8.6	23	4.2	85	⁴ 11.9
Cardiovascular system-----	107	8.5	37	6.8	70	9.8
New growths ³ -----	104	8.3	45	8.2	59	8.3
Digestive system-----	100	7.9	39	7.1	61	8.6
Diseases of body as a whole, general ³ -----	73	5.8	38	7.0	35	4.9
Disorder of metabolism, growth or nutrition ³ -----	62	4.9	36	6.6	26	⁵ 3.7
Due to trauma or physical agent ³ -----	44	3.5	17	3.1	27	3.8
Nervous system-----	38	3.0	20	3.7	18	2.5
Infection by higher plant or animal parasite ³ -----	37	2.9	23	4.2	14	⁵ 2.0
Musculoskeletal system-----	25	2.0	9	1.6	16	2.2
Hemic and lymphatic system-----	22	1.7	10	1.8	12	1.7
Respiratory system-----	19	1.5	4	.7	15	⁵ 2.1
Endocrine system-----	19	1.5	9	1.6	10	1.4
Urinogenital system-----	11	.9	5	.9	6	.8
Due to intoxication ³ -----	12	.9	8	1.5	4	.6
Organs of special sense-----	8	.6	1	.2	7	1.0
Animal diseases-----	1	.1	0	0	1	.1
Other ⁶ -----	73	5.8	37	6.8	36	5.1
Not stated-----	95	7.5	30	5.5	65	9.1
Total-----	1,259	100.0	547	100.0	712	100.0

¹ First choice.

² Where not mentioned, the words "diseases or conditions of" may be understood, for example, "Cardiovascular system, diseases or conditions of."

³ Classified under "Diseases of the body as a whole," but considered separately here.

⁴ Difference between those doing and not doing research is significant at the 1-percent level.

⁵ Difference between those doing and not doing research is significant at the 5-percent level.

⁶ Diseases or conditions not in list but written in as first choice.

diovascular system (9 percent), new growths (8 percent), and the digestive system (8 percent). These preferences coincide to a considerable degree with the various kinds of research in which the Public Health Service is engaged, as for example, studies of vectorborne diseases and infections by lower organisms at the National Microbiological Institute, Rocky Mountain Laboratory, Communicable Disease Center, and Environmental Health Center; psychological disorders at the National Institute of Mental Health; diseases of the cardiovascular system at the National Heart Institute; new growths at the National Cancer Institute; and diseases and conditions of the digestive system at the National Institute of Arthritis and Metabolic Diseases. Officer preferences for research on psychological disorders, cardiovascular diseases, and new growths also fit well the anticipated work of the new Clinical Research Center.

Training and Experience

The questions on training and experience were designed not to duplicate personnel records but to make information relevant to the screening of research officers easily available. The information supplied by officers interested in doing research is summarized in table 4. These officers were grouped into areas according to the functions in which they had advanced training and professional experience regardless of their professions or occupations. Since each officer could indicate training or experience in more than one area, the percentages given are the percentages of all officers marking that area.

More than half (56 percent) of the officers interested in and doing research reported advanced or specialized training in the research area, while only 18 percent of those interested in but not doing research stated they had such

Table 4. Advanced or specialized training and professional experience of 1,259 commissioned officers interested in doing research

Functional area	Total group (1,259 officers)				Doing research (547 officers)				Not doing research (712 officers)			
	1 year or more		None		1 year or more		None		1 year or more		None	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<i>Training</i>												
Research.....	436	34.6	823	65.4	305	55.8	242	44.2	131	¹ 18.4	581	81.6
Public health.....	266	21.1	993	78.9	100	18.3	447	81.7	166	² 23.3	546	76.7
Clinical.....	206	16.4	1,053	83.6	88	16.1	459	83.9	118	16.6	594	83.4
Administration.....	63	5.0	1,196	95.0	24	4.4	523	95.6	39	5.5	673	94.5
Statistics ³	43	3.4	1,216	96.6	25	4.6	522	95.4	18	² 2.5	694	97.5
<i>Experience</i>												
Research.....	700	55.6	559	44.4	478	87.4	69	12.6	222	¹ 31.2	490	68.8
Clinical.....	675	53.6	584	46.4	240	43.9	307	56.1	435	¹ 61.1	277	38.9
Public health.....	495	39.3	764	60.7	185	33.8	362	66.2	310	¹ 43.5	402	56.5
Administration.....	417	33.1	842	66.9	163	29.8	384	70.2	254	² 35.7	458	64.3

¹ Difference between officers doing and not doing research is significant at the 1-percent level.

² Difference between officers doing and not doing research is significant at the 5-percent level.

³ Statistics is a method used by many officers, but it is the major functional area of only a few commissioned officers in the Public Health Service; therefore, it is included under training but not under experience.

training. A sizable portion (44 percent) of officers interested in, and currently engaged in, research indicate no advanced training in research. These officers, however, have had to satisfy the basic academic and professional training requirements of their profession, such as the doctorates in medicine, dentistry, and veterinary medicine, in order to be eligible for the commissioned corps. While such training does not necessarily equip these officers for research, proficiency in research may be gained in positions offering adequate opportunities and supervision. Although not shown in table 4, it is noteworthy that 44 percent of research-interested officers engaged in research have advanced degrees beyond those required for commissioning while 29 percent of those not in research have such degrees. The percentage difference is significant at the 1 percent level.

The total group of officers expressing interest in research have obtained most of their advanced training in three areas: research (35 percent), public health (21 percent), and clinical medicine (16 percent). These officers lack advanced or specialized academic training in administration (5 percent) and statistics (3

percent). It is likely that many of them have received some training in statistics but did not consider it advanced or specialized. It is doubtful, however, that many have had much advanced academic training in administration.

That research experience is also an important differential factor in the background of those officers performing research may be seen from studying table 4. Of the officers expressing interest in research, a markedly higher proportion of officers engaged in research than of those not in research have had 1 or more years of research experience inside or outside the Service—87 percent as contrasted with 31 percent. Those research-interested officers who indicate that they are not in research have a higher proportion of clinical experience (61 percent) than do those in research (44 percent). The group interested in but not doing research also has higher percentages of officers with public health experience and administrative experience.

Summary

The foregoing demonstrates the feasibility of determining the research and other interests and qualifications of an organization's person-

nel by questionnaire and statistical methods. It describes how such information may be made conveniently available to those who utilize research personnel.

Public Health Service officers are a research-minded group. The numbers discovered who report that they are interested in, but are not doing research, now constitute a known research personnel potential of the commissioned corps.

Regardless of their present assignment, officers interested in research prefer clinical, laboratory-clinical, and laboratory types of investigations in medical, biological-medical, engineering-sanitation, and biological fields. They are interested in doing research on a number of different diseases or conditions and show the greatest preference for research on vectorborne diseases (general), infections by lower organisms, psychological disorders, diseases of the cardiovascular system, and new growths.

It is of significance that officers who are interested in research activities, and who are already in the research field, have had more advanced or special training in research, more degrees beyond those required for commissioning in the commissioned officer corps, and more research experience than officers who are interested in, but are not engaged in, research.

ACKNOWLEDGMENTS

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Public Health Service Advisory Councils

Dr. Howard A. Rusk, chairman of the Department of Physical Medicine and Rehabilitation, New York University College of Medicine, has been appointed a member of the National Advisory Arthritis and Metabolic Diseases Council. The Council's recommendations are the basis for Public Health Service research grants in arthritis and metabolic diseases. Dr. Rusk, internationally known for his work in the field of rehabilitation, and for medical articles,

includes among his activities the chairmanship of the Health Resources Advisory Committee of the Office of Defense Mobilization and the chairmanship of the National Advisory Committee to the Selective Service System. Since 1946, he has been an associate editor of the New York Times. In 1952, he received the Lasker Award of the American Public Health Association, and in 1953, the Dr. C. C. Criss Award for his work in rehabilitation.

Studies on Dental Care Services For School Children

—First and Second Treatment Series, Woonsocket, R. I.—

By FRANK E. LAW, D.D.S., M.P.H., CARL E. JOHNSON, D.D.S.,
and JOHN W. KNUTSON, D.D.S., Dr.P.H.

THE WOONSOCKET, R. I., school dental service program provides information on how the problems of accumulated and maintenance dental care needs of school children were met in a specific segment of the population. A cooperative study project of the city of Woonsocket, the Rhode Island State Department of Health, and the Public Health Service, the program was designed to supply complete dental services, except orthodontics, to all school children enrolled in kindergarten through the ninth grade of the public and parochial schools, provided treatment was requested by a parent or guardian.

The Woonsocket study was similar in purpose and procedures to a study conducted in

Richmond, Ind., between December 1946 and December 1951 (1). Possible regional variations in the size of the dental care problems and in the resources available suggested comparative studies to determine the magnitude of these variations and methods of overcoming them. Dental caries prevalence proved to be one-third greater in Woonsocket than in Richmond and missing tooth rates almost twice those in Richmond. About the same amount of dental care in proportion to need (F/DMF) had been received by the children in each city prior to the initiation of the programs.

Woonsocket, a fairly representative New England industrial community in northern Rhode Island, was chosen as the location for this study for several reasons. Its relatively stable population of approximately 50,000, 99 percent of whom are white with French-Canadian stock predominating, provided between 6,000 and 7,000 school children for the study. The program had the official approval and cooperation of the Rhode Island State Department of Health, the city authorities, the State and local dental societies, and the public and parochial school systems. A relatively high dental caries attack rate is common in this region (2).

Planning of the program, purchase of equip-

Dr. Law, regional dental consultant for Region III of the Department of Health, Education, and Welfare, directed the dental research program in Woonsocket, R. I., from 1945 to 1948. Dr. Johnson, now a member of the staff of the Public Health Service outpatient clinic in New York City, was a member of the Woonsocket program staff from 1945 to 1948 and directed the program from 1948 to 1952. Dr. Knutson, an Assistant Surgeon General, is the chief dental officer of the Public Health Service.

ment, selection of space, and preparation of clinic rooms were begun in the fall of 1945. The first clinics were opened on January 14, 1946, and the study was concluded 6¾ years later.

Since the majority of dental defects in any group of children results directly from dental caries, this study, like the one in Richmond, was concerned principally with caries prevalence and the treatment services required to correct carious defects. To facilitate comparison between the studies in the two cities, the data on the Woonsocket study are presented in a pattern similar to that used in the Richmond report.

Clinic Facilities and Personnel

Dental clinic rooms were selected and prepared with the necessary plumbing and electrical outlets in 24 of the city's 27 schools: 15 public, 8 parochial, and 1 orphanage. The size of the clinics varied from 2 to 7 dental chairs, depending upon school enrollment and the space available. In most schools, attractive, well-lighted rooms were provided, although in two small elementary schools, it was necessary to put up temporary partitions in classrooms.

Two modern standard dental units, 2 junior chairs, 2 operating stools, and an instrument cabinet containing duplicate sets of instruments were the basic equipment for each dentist. Operating lights on the units, an X-ray machine, sterilizer, and additional equipment completed each dental clinic. The arrangement of the equipment and the provision of adequate auxiliary personnel encouraged each dentist to work from a seated position at all times. These working conditions were designed to reduce fatigue and to improve the quality and quantity of the dentists' services (3).

Organization and scheduling was planned to maintain 3 clinics in operation throughout the school system at one time. When dental treatment was completed in one school, the equipment, supplies, and personnel were transported to the clinic room in another school. The average clinic was dismantled, transported, and set up ready for use in the next school in approximately 1½ days.

Project personnel included 4 to 7 dentists, 1 or 2 dental hygienists, 8 dental assistants, 1 fol-

Table 1. Age distribution of all children examined, by patient status, first and second treatment series, Woonsocket, R. I.

[Number of children]

Age last birthday	1st treatment series			2d treatment series		
	Patient status		All children	Patient status		All children
	Clinic	Private		Clinic	Private	
All ages...	5, 944	904	6, 848	5, 189	918	6, 107
5-----	464	53	517	220	35	255
6-----	696	81	777	624	88	712
7-----	669	69	738	634	94	728
8-----	594	61	655	613	94	707
9-----	624	77	701	559	75	634
10-----	573	57	630	608	87	695
11-----	580	82	662	482	67	549
12-----	544	85	629	500	115	615
13-----	467	96	563	419	110	529
14-----	439	135	574	344	93	437
15-----	265	90	355	160	52	212
16-----	29	18	47	26	8	34

lowup worker, 1 secretary, and 3 clerks. The dental hygienists gave prophylaxis and topical fluoride applications. The followup worker checked on treatment certificates from patients of private dental practitioners, encouraging these as well as clinic patients to obtain complete treatment. In addition, she transported to a clinic children needing emergency treatment or children whose treatment had not been completed when the clinic was moved, and she delivered supplies. The secretary cared for the central office and supply room. A clerk was assigned to each clinic to handle records, maintain the flow of patients, and perform related duties as required. An average of 1½ dental assistants for each dentist was on duty in each clinic.

The 8 dental assistants employed at the start of the study received 10 weeks of intensive training at the Naval Dental School in Bethesda, Md. They in turn helped to train assistants employed as replacements from time to time as the study progressed. The entire staff received inservice training at irregular intervals from each of the seven dental consultants

to the program, who also served the Richmond project. The consultants were experts in pedodontics, dental materials, and the use of auxiliary personnel.

Clinic Routine

Before a clinic was installed in a school, dental examination records were obtained for the entire school population. Teachers issued "request for treatment" slips to all pupils with instructions to return them signed by a parent or guardian, indicating whether he wanted the child's dental care provided in the school clinics or in the offices of the family dentist. Care in the school clinics was requested for about 85 to 87 percent of the children enrolled.

The dental-care program was divided into four consecutive treatment series. A treatment series consisted of dental examination of the total enrollment, kindergarten through junior high school, and completed treatment of all children whose parents requested treatment. This report is limited to the first and second treatment series for children receiving care in the school dental clinics.

Examination

Complete dental examinations of all children were made in each school. Examinations were made with a No. 4 plain mouth mirror and sharp No. 5 double-end explorers. X-rays were used whenever there was any doubt about clinical diagnosis.

The following information was recorded on examination records maintained for each child during each treatment series:

- Number of primary and permanent teeth erupted and unerupted.

- Number of teeth missing because of extraction.

- Number of teeth indicated for extraction.

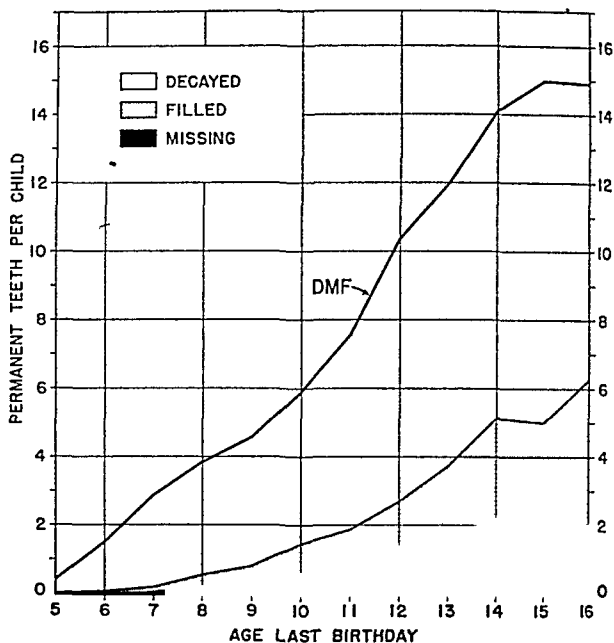
- Number of roots remaining.

- Number of unfilled carious teeth and the surfaces involved.

- Number of filled teeth and the surfaces restored.

Observations were made on all teeth present in the mouth. Teeth recorded as carious were those which showed actual cavities, no matter

Figure 1. Dental caries prevalence in permanent teeth, first treatment series, Woonsocket, R. I., ages 5-16.



how small, as well as deep pits and fissures in which the explorer penetrated with pressure and resisted removal.

A dental assistant recorded the information on the record cards in code to facilitate transfer to punch cards for processing and analysis. A serial number was assigned to each child for the duration of the study project. A master card index system was maintained to simplify reference to a child's previous dental record.

Treatment

Once the examinations had been completed, clinical treatment was given to all children whose parents had signed consent slips. During treatment the children received chairside instruction in oral hygiene.

Clinics were operated on a year-round basis, with appointments for treatment continuing during vacations and holidays. Young children were treated in the early forenoon and the older children received the later appointment times. Extractions were generally avoided during a child's first dental experience. Efforts were made to complete all operative treatment in the teeth of at least 1 mouth quadrant during a single sitting. Treatment periods varied from 15 to 30 minutes for younger chil-

dren and from 15 minutes to 1 hour for the older children.

The types of treatment included:

- Permanent fillings (amalgam and silicate cement).
- X-rays as required during treatment.
- Vital partial pulpectomies of permanent and primary teeth.
- Root canal therapy of permanent anterior teeth.
- Extractions.
- Treatment of periodontal diseases.
- Prophylaxis.
- Topical fluoride applications.
- Polishing of fillings.

The amount and type of treatment given each child were noted on the record cards. Each dentist and dental hygienist recorded all of their clinical services on daily work sheets. At the end of each 10-day working period these sheets were combined in a biweekly report showing an accurate running account of services performed during the study project.

During the first treatment series, a total of 6,848 children, 5 through 16 years of age, representing 96.5 percent of all children in kindergarten through the ninth grade, received dental examinations; 5,944, or 87 percent of those examined, requested and received dental treatment in the school clinics. In the second treatment series 6,107 children in the above age groups, or 99.7 percent of the total, were examined; 5,189, or 85 percent, of these requested treatment in the dental clinics. About 2,500 children received initial care in the second treatment period. The number of children not receiving care in the school clinics was essentially the same in both series (table 1).

Comparison of Caries Prevalence

The average annual increment of decayed permanent teeth, estimated from the difference in prevalence rates at individual ages, was 1.31 teeth per child in the first treatment series and 1.43 teeth per child in the second.

To measure and express the workload for this study adequately, all teeth requiring fillings, whether or not they had previously been filled, were counted as "carious." Teeth indi-

Table 2. Dental caries prevalence in permanent teeth of children, first and second treatment series, Woonsocket, R. I.

[Number of teeth per child]							
Age last birthday	Carious ¹	Filled	Carious and/or filled ²	Missing			DMF
				Total	Ex-tracted	Ex-tractions indicated	
	1st treatment series						
5-16 ³	6.39	1.32	7.09	0.99	0.66	0.33	7.76
5-----	.41	.00	.41	.00	.00	.00	.41
6-----	1.51	.03	1.53	.01	.00	.01	1.53
7-----	2.79	.14	2.85	.04	.02	.02	2.87
8-----	3.62	.33	3.77	.21	.08	.13	3.85
9-----	4.25	.50	4.43	.29	.14	.15	4.57
10-----	5.30	.83	5.59	.61	.33	.28	5.92
11-----	6.57	.98	7.03	.89	.54	.35	7.57
12-----	8.85	1.31	9.56	1.38	.80	.58	10.36
13-----	9.90	2.21	11.03	1.54	.98	.56	12.01
14-----	10.70	2.91	12.56	2.21	1.54	.67	14.10
15-----	11.88	2.33	13.16	2.67	1.83	.84	14.99
16-----	10.90	4.24	13.21	2.00	1.69	.31	14.90
	2d treatment series						
5-16 ³	5.30	3.87	7.84	0.77	0.66	0.11	8.50
5-----	.48	.00	.48	.00	.00	.00	.48
6-----	1.82	.04	1.83	.01	.01	.00	1.83
7-----	3.24	.26	3.33	.07	.01	.06	3.34
8-----	3.56	1.17	4.15	.12	.03	.09	4.18
9-----	3.96	2.17	5.08	.16	.08	.08	5.16
10-----	4.90	3.06	6.64	.33	.22	.11	6.85
11-----	6.14	3.56	8.29	.46	.34	.12	8.65
12-----	7.68	4.50	10.53	.81	.64	.18	11.16
13-----	8.72	5.85	12.52	1.15	.96	.19	13.47
14-----	8.52	7.24	13.49	1.38	1.20	.18	14.67
15-----	8.31	8.62	14.12	2.05	1.88	.17	16.00
16-----	6.23	9.92	13.65	2.70	2.58	.12	16.23

¹ Includes teeth carious only, those both carious and filled, and those indicated for extraction. ² Based on actual number of teeth carious, filled, or carious and filled. Teeth that are both carious and filled are counted only once. ³ Average of the rates for ages 5-16.

cated for extraction were also counted as "carious." (Data shown in the charts, figures 1 and 2, are cumulative and, therefore, do not

necessarily correspond with figures given in table 2. "Decayed," on the charts, shows the number of teeth that were decayed only and does not include teeth decayed and filled or teeth indicated for extraction.) Approximately 84 percent of the children in the first treatment series had one or more carious permanent teeth; in the second series about 87 percent were so

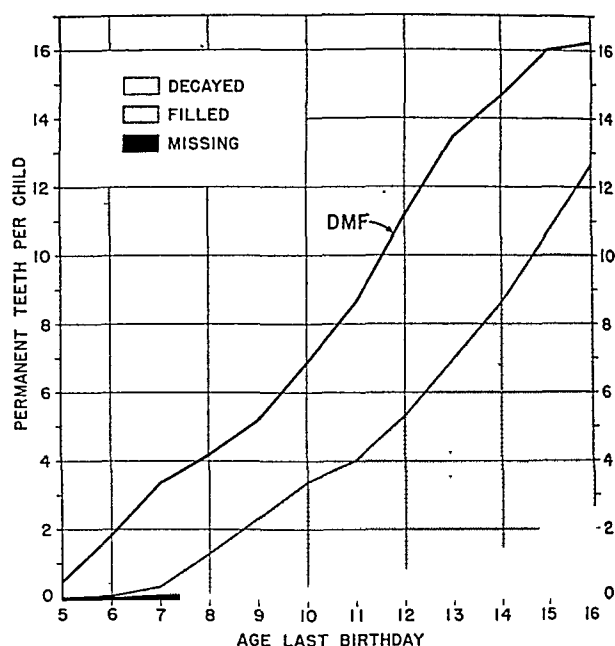
Table 3. Dental caries prevalence in primary teeth of children, first and second treatment series, Woonsocket, R. I.

[Number of teeth per child]

Age last birthday	Carious ¹	Filled	Carious and/or filled ²	Extractions indicated
1st treatment series				
5-16 ³	2. 86	0. 10	2. 91	0. 40
5.....	6. 21	. 16	6. 28	. 36
6.....	6. 69	. 19	6. 79	. 50
7.....	6. 30	. 23	6. 43	. 86
8.....	5. 66	. 29	5. 83	1. 07
9.....	4. 36	. 16	4. 46	. 87
10.....	2. 67	. 07	2. 70	. 49
11.....	1. 38	. 03	1. 39	. 30
12.....	. 67	. 02	. 69	. 20
13.....	. 27	. 01	. 27	. 10
14.....	. 05	. 00	. 05	. 01
15.....	. 05	. 00	. 05	. 02
16.....	. 00	. 00	. 00	. 00
2d treatment series				
5-16 ³	2. 69	0. 17	2. 78	0. 52
5.....	5. 81	. 24	5. 93	. 56
6.....	6. 32	. 27	6. 45	. 93
7.....	6. 16	. 40	6. 36	1. 40
8.....	5. 42	. 43	5. 65	1. 28
9.....	4. 24	. 40	4. 47	. 96
10.....	2. 42	. 16	2. 51	. 61
11.....	1. 16	. 07	1. 20	. 31
12.....	. 49	. 01	. 50	. 10
13.....	. 16	. 01	. 17	. 07
14.....	. 08	. 00	. 08	. 03
15.....	. 01	. 00	. 01	. 00
16.....	. 00	. 00	. 00	. 00

¹ Includes teeth carious only, those both carious and filled, and those indicated for extraction. ² Based on actual number of teeth carious, filled, or carious and filled. Teeth that are both carious and filled are counted only once. ³ Average of the rates for ages 5-16.

Figure 2. Dental caries prevalence in permanent teeth, second treatment series, Woonsocket, R. I., ages 5-16.



affected. In the two rounds, there were totals of 32,359 and 25,544 carious teeth involving about 58,318 and 41,376 surfaces, respectively.

As shown in table 2 and figures 1 and 2 the age specific DMF (decayed, missing, and filled) rates for permanent teeth increased in the first series from 0.41 at age 5 to 14.99 at age 15; in the second, from 0.48 to 16. At the start of the first series the average 15-year-old had 11.88 carious teeth, 2.67 missing teeth, and 2.33 filled teeth. The examination for the second series showed a decrease in carious teeth (8.31) and missing teeth (2.05) and a significant increase in filled teeth, from 2.33 to 8.62, for the average 15-year-old.

Twenty-two percent of the children in the first treatment series had one or more extracted permanent teeth; the corresponding figure for the second series examination was 18 percent.

Only 20 percent of the children had one or more filled permanent teeth on examination in the first round, but the percentage increased to 58 in the second series.

Of the primary teeth examined, 47 percent were found carious in the first series. The average 7-year-old had 12.7 primary teeth, of which 6.30, or nearly 50 percent, were decayed

(table 3). Only 4 percent of the group had one or more primary teeth which had been filled prior to the first treatment series. Examination prior to the second treatment series demonstrated only minor improvement in care of the primary dentition. The number of primary teeth filled increased from 709 in the initial round to 1,107 in the second.

During the initial treatment series the main concern was care of the accumulated defects of the permanent teeth; primary teeth received only emergency or very selective treatment. In spite of the high caries attack rate and the time required to complete the first treatment series (30 months), this policy was modified to a considerable extent in the second round. As shown in table 4, the number of primary teeth filled per child during the second round was more than 10 times as large as the number during the first.

Of the children requesting clinic care, 88 percent in the first series and 98.6 percent in the second received complete treatment; 78 percent and 87 percent of the children treated received fillings in one or more permanent teeth. More than 17 percent had at least one or more permanent teeth extracted during the first series, but only 9 percent of the children required extractions the second time around. The 684 permanent teeth which were extracted in the second series indicate considerable improvement over the 1,778 extracted during the initial treatment series.

The total number of permanent teeth filled in the first and second series was 25,939, and 24,682, respectively, averaging 4.60 and 5.08 teeth per child for all age groups. The average 15-year-old had 9.60 surfaces on 5.72 teeth restored during the initial treatment and 7.77 teeth involving 12.67 surfaces received fillings in the second series (table 4).

Selective treatment of primary teeth resulted in a total of 530 primary teeth filled in the first series and 4,140 in the second. Extractions of primary teeth numbered 5,131 and 4,391.

Additional treatment included 900 pulp capings and 29 vital partial pulpectomies on permanent and primary teeth during the first period. These treatments numbered 1,163 and 214, respectively, during the second series.

Table 4. Dental treatment to permanent and primary teeth of children, first and second treatment series, Woonsocket, R. I.

[Number per child]

Age last birthday	Number of permanent teeth			Primary teeth		
	Teeth filled	Filled surfaces	Teeth extracted	Teeth filled	Filled surfaces	Teeth extracted
1st treatment series						
5-16 ¹	4. 60	7. 79	0. 32	0. 07	0. 12	0. 58
5-----	. 37	. 57	. 00	. 25	. 43	. 37
6-----	1. 47	2. 40	. 02	. 20	. 37	. 64
7-----	2. 70	4. 56	. 04	. 21	. 35	1. 03
8-----	3. 32	6. 16	. 16	. 10	. 16	1. 35
9-----	3. 97	7. 29	. 19	. 07	. 11	1. 26
10-----	4. 78	8. 57	. 36	. 04	. 05	. 86
11-----	6. 03	10. 25	. 43	. 00	. 00	. 63
12-----	7. 68	12. 31	. 67	. 01	. 02	. 43
13-----	7. 63	12. 50	. 62	. 01	. 01	. 22
14-----	6. 49	10. 55	. 54	. 00	. 00	. 08
15-----	5. 72	9. 60	. 63	. 00	. 01	. 05
16-----	5. 07	8. 76	. 21	. 00	. 00	. 00
2d treatment series						
5-16 ¹	5. 08	8. 35	0. 15	0. 86	1. 75	0. 66
5-----	. 50	. 77	. 00	3. 29	6. 62	. 64
6-----	1. 82	3. 21	. 00	3. 02	6. 18	1. 07
7-----	3. 15	6. 04	. 06	2. 42	4. 91	1. 60
8-----	3. 45	6. 57	. 12	1. 25	2. 49	1. 54
9-----	3. 83	6. 91	. 10	. 33	. 66	1. 24
10-----	4. 70	7. 58	. 13	. 04	. 09	. 78
11-----	5. 93	9. 18	. 17	. 00	. 01	. 47
12-----	7. 48	11. 26	. 21	. 00	. 01	. 27
13-----	8. 40	12. 87	. 28	. 01	. 03	. 16
14-----	8. 18	12. 67	. 24	. 00	. 00	. 07
15-----	7. 77	12. 67	. 28	. 00	. 00	. 03
16-----	5. 69	10. 46	. 23	. 00	. 00	. 00

¹ Average of the rates for ages 5-16.

Every child received at least 1 dental prophylaxis during each round. In the second period an attempt was made to provide every child with a series of 4 topical fluoride applications; a total of 5,016 children received this treatment.

Dentist Man-Hours

During the first treatment series a ratio of 1 dentist to 384 children treated per year resulted from an average of 6.2 dentists on duty in the program. During the second series an average of 5.5 dentists operating produced a ratio of 1 dentist to 470 children treated per year. This staffing average is based on a full 65-hour, biweekly period for all dentists assigned during both series with no deductions made for administrative work, vacations, illness, training, or other nonclinical activities.

Dentist man-hour rates were determined from the total clinic time actually worked by all dentists during the 30 months required for the first treatment series and the 24 months for the second. During the first round 3.3 dentist man-hours were required to complete the treatment of each child, but in the second round only 2.8 dentist man-hours, or 86 percent as much time as in the first, were needed for this work. The average number of permanent teeth treated per dentist man-hour was about the same in both series: 2.1 in the first and 1.9 in the second. However, the 0.7 primary teeth treated per dentist man-hour in the second series was an increase of 140 percent over the number treated per dentist man-hour in the first period.

The reduction in the second treatment series of 0.5 dentist man-hour required to complete the treatment of each child resulted primarily from the lower prevalence of carious teeth and to improved operating and clinical procedures. This reduction would undoubtedly have been greater had there not been constant addition of new patients with practically no previous dental treatment and had the time (2½ years) between the two treatment series been less.

Summary

Dental examination and complete dental treatment were given 5,944 children in kindergarten through the ninth grade in the first treatment series and 5,189 children in the second

treatment series of the Woonsocket, R. I., dental care study.

The first treatment series, covering a total of 30 months, was designed to care for the accumulated dental needs of the group, with primary emphasis on care of defects in permanent teeth.

The second treatment series, requiring 24 months, was designed to treat the increment of defects occurring between treatment periods and to provide substantially more care for the primary dentition. The proportion of children requiring fillings during the second round was no less than in the initial series. In addition to the increment of defects occurring subsequent to treatment in the first series, about 2,500 children received initial care in the second series.

Only 20 percent of the children had any permanent teeth filled prior to the first series; this figure increased to 58 percent at the start of the second.

Examinations for the second treatment period demonstrated that the average 15-year-old had 8.62 filled teeth, compared to only 2.33 at the start of the first series.

In all age groups, 1,778 permanent teeth were extracted in the first series and only 684 in the second.

There was a reduction of 14 percent in the number of dentist man-hours required to complete the treatment of each child: 3.3 dentist man-hours were required in the first series and 2.8 in the second series.

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RECORD and REPORT SYSTEMS in local health departments

with contributions from
Chapel Hill, N. C.,
Charleston, W. Va.,
and Portland, Maine

Among the building stones essential to the creation of an effective structure for public health services are records and reports. Recent broadening of local health department responsibilities and changing public health practices have underscored the importance of rational records and reports systems and procedures in developing, focusing, and administering services, as well as in analyzing and measuring the effectiveness of those services.

Changes in function of local health departments are reflected in the responsibilities of the professional staff. Emphasis on the individual and the family, concentration on control programs for long-term diseases, and specialization in professional fields have intensified the demand for records and reports that will aid the health department staff in giving and evaluating the services for which the department is responsible. Records and reports must therefore be designed to permit qualitative and quantitative analysis of the health services to individuals, families, and the community and to facilitate periodic appraisal of each of the health department's programs.

Considerations such as these underlie the three discussions of local health department records and reports which comprise this symposium. Quite different points of view are expressed by the authors but they and the recently published Public Health Monograph No. 15 (see *Public Health Reports* for November, pp. 1078-82) may stimulate further suggestions of ways and means by which health department records can be more effectively utilized.

Rough sketches of proposed forms were drawn and presented by various participants from time to time. Some were accepted in part or in whole; others were rejected. The rejected sketches were redesigned and presented again. By this process there emerged for experimental use a master card, a family folder (containing a family data sheet and a family service narrative form), and an individual observation record.

These forms comprise the basic simplified service records. They provide for a summary of all clinical and nursing services to an individual, a record of pertinent information on the family as a unit, a narrative record of each service to an individual member or to the family as a group, and a record of all clinical services to an individual.

Master Card

The master card, an 8- by 5-inch form designed for use on both sides, summarizes all services provided for an individual. Each person registered with the department has such a card. Sometimes it is the only record for the individual. It combines information formerly recorded on six separate forms, namely, birth summary, immunizations, index, laboratory diagnostic services, X-ray reports, and death summary. It also provides for recording single visits or limited services to avoid opening and closing another record.

The first section of the card has space for identifying information, including name, race, sex, date of birth, registration number, name of father or husband, name of mother or wife, and mailing address.

The second section replaces and is identical to the former immunization card, with the addition of write-in spaces for immunizations which may be introduced in the future. It includes lines for recording by date immunizations for whooping cough, diphtheria, tetanus, smallpox, and typhoid.

The third section, a summary of basic records, compares with the old index card. It has columns for the date of first admission to a service, the type of service, the name of the basic form on which the service is recorded in detail (family service narrative, individual ob-

servation record, tuberculosis program register, or orthopedic clinic record), the file in which the form may be found, and the date the service is terminated.

On the reverse side of the card, miscellaneous services not recorded elsewhere are listed. To the left are 3 columns, 1 each for date, type, and result of a test or service; the remainder of the space—over half the width of the card—is for remarks. Here may be summarized data on negative laboratory reports, negative X-ray reports, the issuance of health cards, and other limited services, and data on deaths.

The Family Folder

The family folder is a lettersize manila folder of special cut labeled to show the name of the head of the family. This size folder makes it possible to insert all records without folding and to include patient and family correspondence as well as service records.

Family Data Sheet

The family data sheet was designed as a separate record to permit the replacement of worn or soiled folders without the necessity of copying the information and to encourage the typing of the record, particularly the identifying information and family roster.

This sheet provides a summary of pertinent data on the family as a unit. Following a section for identifying information at the top of the sheet is a section for a complete roster of family members. After each name in this list is space for sex, date of birth, and changes in status, such as marriage, entrance into the armed services, or departure from the home for other reasons, by date.

A section on both sides of the form equivalent to a full page is provided for the narrative recording of significant economic and social data. In this section extra-family members living in the home are accounted for in terms of their influence upon the family life. If one of these members receives service, a folder is opened for him. The objective of this arrangement is to encourage the study of families as units.

At the bottom of the form on the reverse side is a section for the chronological summarization of the various services provided for individual members of the family.

Family Service Narrative

The family service narrative form is an 8½-by 11-inch sheet ruled on both sides. At the top is a space for family identification. In a column at the left are entered the date, place of visit, type of service, and individual served. Routines normally associated with the specific type of visit are recorded in a predetermined order set forth in the records guide prepared as a part of the project. This makes it possible to find these data without reading the complete narrative statement. Each narrative entry is signed by the person performing the service recorded. All visits to individual members of the family and to the family as a unit are recorded in chronological order on the same form. This system is an improvement over the old one, which provided separate forms of different types and often of different colors for each type of service.

Individual Observation Record

The individual observation record, an 8½-by 11-inch card, is used to record in chronological order data on all types of clinical services given an individual. It replaces the numerous forms previously used for the various clinical services. It contains sections for identifying information; medical history; disease experience; immunization data (for use in well-child conferences); findings, recommendations, and progress notes, by date and type of service; and results of laboratory and other tests, by date and type. Each entry in the narrative portion of this form—the section for findings, recommendations, and progress notes—is signed by the person performing the service.

Other Records

The tuberculosis program register and the orthopedic clinic record used in the earlier system were retained without change in the new system. The former, a visible file, is a modern and useful device for operating a tuberculosis program and is a permanent part of the new record system. The latter must be used until all counties served by the orthopedic clinic adopt the simplified forms.

Supplementary records giving detailed data

are used when needed, particularly in the initiation of special programs. For example, in the nutrition program it is necessary to keep daily records of individual food consumption to determine nutritional patterns. These data are summarized on the family service narrative or on the individual observation record. Other forms, such as the laboratory form which accompanies a blood specimen to the laboratory and on which the laboratory findings are recorded, are destroyed after the results have been posted on the basic record cards, proofread for accuracy, and tabulated for reports.

The Filing System

A simplified system for filing the new service records was also developed. The master cards, which constitute the greatest volume and which are the records most frequently referred to, are filed alphabetically. Guide cards subdivide each group of approximately 25 cards. The cabinet is located beside the receptionist's desk, where the patients are registered, and is accessible to all staff members.

Active family folders containing individual observation records of family members are filed alphabetically in lettersize cabinets behind one-fifth cut guide cards. Alphabet guides are in the first position; guides with family names which occur most frequently or which are withdrawn and refilled most frequently, in the second; the family folder, labels, in the third and fourth; and "out" cards in the fifth. Immediately following the family folders are miscellaneous folders (for each alphabet letter) containing the individual observation records and correspondence for patients for whom there are no family folders.

Inactive records are transferred to an inactive file set up like the active file. Pending files are used from time to time for groups of records withheld for completion of immunizations or for those used routinely in outlying clinics.

The System in Operation

In addition to the development of new forms and a new filing system, the records project included the study of such factors as the floor plan of the building, the position of furniture

Compact, Organized Central Records Room Facilitates Management

Located on the first floor of the health department, the records room, shown in the photograph, contains: (1) master card file; (2) visible file holding tuberculosis case register; (3) intercommunication system box; (4) dumb-



waiter for sending records to the second-floor nurses' office; (5) file for family folders and individual observation records; (6) file for discontinued records; (7) metal case for carrying records to outlying clinics; and (8) file for small and large X-rays. The sketch above shows a nurse in the second-floor office adjacent to the clinic receiving a record sent up in the dumbwaiter from the records room.

and equipment, and the location of lighting fixtures in relation to the flow of records and the routing of patients. As a result of a better understanding of these factors, the staff nurses voluntarily agreed to exchange offices with the receptionist in the interest of greater efficiency. To facilitate the flow of records, a dumbwaiter, designed by the health officer, was installed to carry records from the first-floor file room to the second-floor clinic.

The forms were used on a trial basis for 8 months. A preliminary guide to their use was prepared. During the trial period, staff members kept notes on problems encountered and offered suggestions for using the records more effectively. Periodic conferences were held to evaluate progress and to consider necessary adjustments.

Only a few minor changes were made in the forms, but a number of changes were made in procedure. The transfer of information from old to new forms produced the most difficulty

and placed the heaviest burden on the staff. In May 1951, a manual of instructions incorporating the results of the preceding 8 months' experience was completed. This manual was prepared by the University department of field training.

The successful changeover from the old record system to the new was made possible through the combined efforts of public health workers from the district health department, the School of Public Health, and the State board of health, representing several different public health disciplines.

The results of this project have reached a great many people by various avenues. Students assigned to the health department for field training or for the residency program for medical officers have had an opportunity to see the system in operation. Seminars on records have been conducted for the students of the North Carolina School of Public Health as part of their study programs. The system has been

explained to visitors to the district health department. The district health officer reported on the simplified records at a meeting of the local health officers of the State. Similarly, the nursing supervisor discussed the records with the nursing supervisors of the State at an annual meeting. At the 1952 annual meeting of the Southern Branch of the American Public Health Association during the "curbstone consultation" session, the new system was ex-

plained by the nursing supervisor and by a records consultant from the State board of health. In 1953, experience with the new system was reviewed during a panel discussion on service statistics before the statistical and clerical section of the Southern Branch of the American Public Health Association. Copies of the manual of instructions with copies of the forms have been sent to public health workers in a number of other States and countries.

PHR symposium

Kanawha County, West Virginia

Coordinating Medical and Nursing Records

By L. A. DICKERSON, M.D.

THE NEED FOR a revision in the system of records and reports in use in the Kanawha-Charleston (W. Va.) Health Department was brought forcibly to our attention not long after consolidation of city and county units late in 1947. A short time after this merger, the local Visiting Nursing Association moved to affiliate with the official agency and to coordinate its nursing program with the official nursing program. Thus, the personnel, equipment, and records of three agencies were brought together in one location.

Within little more than a year after consolidation of these health units, the number of clinic services had more than doubled, with a corresponding increase in the case load. Spe-

cialized record forms were used for each of the clinic services, and the files were located in four different offices. Since no central index had been maintained, it was often necessary to search the files in each office in order to obtain complete information on patients receiving more than one service.

As a starting point in planning for a revision of the system, a record committee was selected from members of the health department. Included on the committee were the supervisor of nursing, the sanitation director, one clinic nurse, a records clerk, the administrative assistant, and the secretary to the public health director. Consultant help was sought and obtained from the State health department and from the regional office of the Public Health Service. Many meetings were held over a period of several months to decide upon the projected new record forms and procedures. Since provision for a health center was being made in a general hospital then under construction in another part of the city and only the clinic services were to be moved to this location upon its completion, it was decided that no attempt should be made to combine medical and nursing records, but instead to provide for interchange of infor-

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mation between the two services. Sanitation records were already centrally located within the sanitation division and were considered to be satisfactorily maintained.

The objectives set forth by the record committee in its approach to the problem were:

1. To centralize in one record all medical information on each patient and to provide for interchange of information between medical and nursing services.

2. To eliminate duplication and unnecessary recordkeeping.

3. To reduce the number of record forms.

4. To establish a routine for followup of service where indicated.

5. To compile reports only on information that would be of use.

Many considerations of a practical nature entered into the thinking of the committee in striving for the attainment of these objectives. A majority of the clinic service records then in use were 5 inches by 8 inches in size but of different designs. A major complaint of personnel using these records had been that the same basic information on a given patient was recorded on several different forms. To meet this objection it was decided that a single form should be devised for recording all medical, social, and economic information needed on the patient, whatever the clinic service.

Clinic physicians had expressed a desire for a form with only a few general headings but with sufficient space for entering rather complete notes covering history, physical findings, and recommendations. Accordingly, a simplified history and physical examination form was prepared.

Three other forms that were considered essential were developed and adopted without disagreement. These provided for recording (1) all public health laboratory tests on a single form, (2) continuing observations and services, and (3) the public health nurse's report to the clinic. Provision was also made on the latter form for supplying information to the public health nurse as to physical findings and recommendations of the clinic physician.

Since an appreciable number of persons visiting the clinics received only screening tests, the need was felt for a form less expensive than

a folder to record miscellaneous services other than services rendered by a physician. This consideration led to the adoption of a form which could serve as an index card and could also be used to record such miscellaneous services as laboratory tests, immunizations, and chest X-rays.

In order to utilize filing equipment then on hand and to make it possible to interfile old service records with the index cards, it was decided that this form should be 5 inches by 8 inches in size.

Forms and Rules for Use

The record forms that were finally adopted and the general rules for their use are as follows:

Index card. This card is completed for each person visiting the health center for service. A number is assigned to each individual at the time of the first visit, to be retained for all subsequent visits. For all patients not examined by a physician in one of the clinics, this will be the only service record.

Record folder. A lettersize manila folder containing the necessary basic forms is prepared for each individual to be seen by a physician in one of the clinics. A distinctive color tab is affixed to the folder to denote the clinic service. The individual's number, obtained from the index card, is entered in the upper right-hand corner of the record. Each folder has a pocket inside of the back cover to hold odd-sized, old record forms.

Forms Included in Record Folder

Five basic forms are included in the record folder:

Basic data form. This form provides space for recording all necessary basic information on the patient and members of his immediate family. It is completed for each individual at the time a record folder is initiated. When more than 1 member of a family visits the health center at 1 time, detailed information concerning the family is recorded for 1 member only and a reference note made on the records of the others.

Medical sheet. Pertinent history, physical findings, and recommendations are entered on

this sheet by the examining physician for all public health clinic services except tuberculosis, for which there is a special form. A few outpatient clinics require a special form in addition to the medical sheet and the tuberculosis form.

Laboratory report form. All laboratory reports are entered on this form except when laboratory tests are performed in the hospital laboratory. In the latter instance the original report is included in the record folder. Chest X-ray readings are sound recorded and transcribed directly to the laboratory report form.

Progress notes. This sheet is used by all workers in the health center to record their observations on or services to a patient. Social service and mental hygiene clinic workers record only a summary of their findings and recommendations on this form and keep a separate file of detailed case studies.

Nurse's report to clinic. This form is completed and sent to the health center for all individuals referred to the clinic by the public health nurse. It is also used to inform the public health nurse of the clinician's findings and recommendations for home care. When used for the latter purpose it is retained in the nursing record.

The basic data and progress notes sheets are stapled to the left inner side of the folder, with the basic data underneath. Staples are used here for economy, to reduce bulk, and also because there is usually no necessity to remove these forms from the folder.

On the right side of the folder a binder holds the remaining record forms in place in the following order from the top: medical sheet, nurse's report to clinic, correspondence, laboratory reports.

Appointment cards, tickler files for followup, and clinic route slips are also prepared. The route slip is attached to the record folder and serves to indicate the services to be received by the patient.

Changing to the New Record System

The date for changing from the old to the new system was set to be effective when clinic services were activated in the new health center.

Since the tuberculosis case load was one of

the highest, it was decided to use the active register of these patients as a basis for converting old records to the new system. About 6 weeks prior to the proposed date of the change, an additional records clerk was employed on a temporary basis. This clerk reviewed the tuberculosis records and prepared a new folder for each active case, filing the old clinic record forms in the pocket inside the back cover of the manila folder. Each patient was assigned a permanent clinic number. Other clinic files in the department were searched for each patient whose record was transferred into the new system and, when other records of service to these patients were found, the various-sized old record forms were included in the pocket of the folder. No attempt was made to transfer detailed information from the old to the new forms.

The process of combining all records on active tuberculosis cases and entering them in the new record folders before moving to the health center constituted a trial period with the new system. This enabled us to make many adjustments in record procedures which contributed materially to smoothness of operation when the system later became effective for all service records.

Clinic equipment, personnel, and records were transferred to the new location, all services were discontinued for 3 days, and all active clinic records were moved into a central records office in the public health wing of the hospital. When operation was begun in the new location, all patients coming in for clinic services had records instituted in accordance with the new system.

As had been expected, several problems were encountered during the period of transition. However, most of these problems were minor in nature and were concerned with the routing of patients and flow of work. Somewhat detailed rules for use of the new records had been developed prior to their adoption, and these had been discussed in frequent conferences with all personnel using the record forms. Although an additional experienced clerk had been appointed for a 2-month period, the burden thrown on the chief records clerk was exceptionally heavy during the trial period when active tuberculosis records were being

converted into the new system. It was gratifying, however, to note that after a short period of experience, less time was required on the part of all concerned in maintaining the system. It has not been necessary to employ additional record personnel, although the case load remains at essentially the same level as it was prior to the institution of the new system.

With the exception of 6 lettersize filing cabinets, no major new equipment items were required.

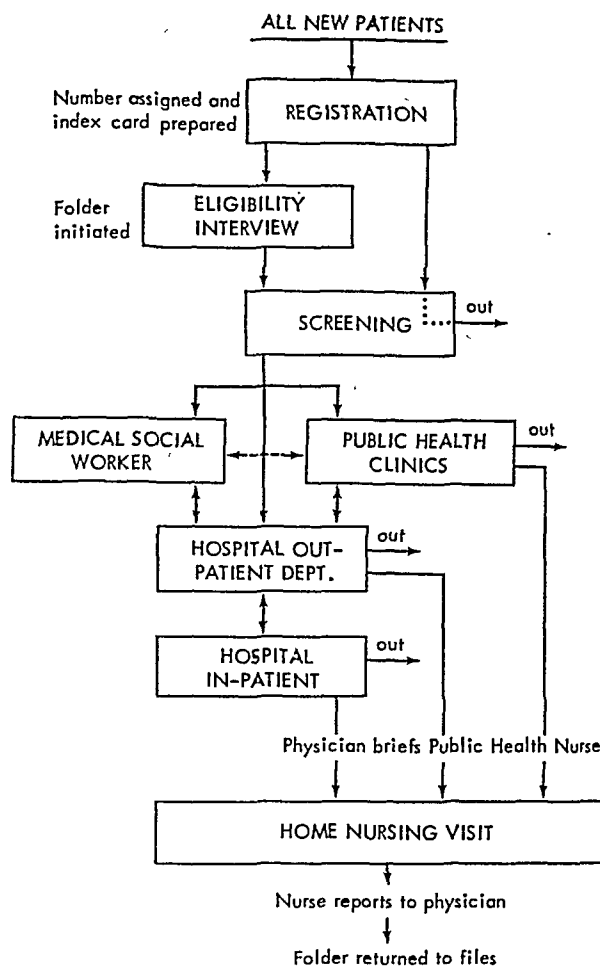
Cross-Referral of Records

Several months after the new record system was instituted, outpatient clinic services were established by the hospital in a separate wing. By agreement with hospital authorities, all new patients reporting for outpatient services are interviewed by health unit personnel and a decision made as to their eligibility for such services. Thus, the records for patients visiting the hospital outpatient department are initiated in the health center as well as those for patients visiting strictly public health clinics.

After registration, all new patients routinely have blood specimens drawn for a serologic test for syphilis and for dextrose determination and receive a chest X-ray. Those patients who are to visit an outpatient clinic are then escorted with their records to the outpatient department of the hospital. These records remain in the outpatient department, are filed there, and their location is shown on the health department index card. If a patient is referred back to one of the public health clinics, his record is requested from the outpatient department of the hospital and its whereabouts shown by an "out" card placed in the outpatient department file.

When a patient is transferred from one of the clinics into the hospital, a transfer form is executed and, in addition, the outpatient clinic record and/or public health clinic record is incorporated into the hospital record folder. Upon discharge from the hospital, patients who are referred for clinic service have their records made available to the outpatient department. When home nursing visits are requested, the nurse's report to clinic form is completed by the physician requesting the visit, and this form is retained in the individual's record of

Flow of patients and records, Kanawha-Charleston Health Department.



"Out" indicates home visit not necessary

nursing service. After making the home visit, the public health nurse uses this form to report to the clinic physician the observations made and services rendered. This report is then included in the clinic service record. The chart illustrates the flow of patients and records through the health department clinics and the hospital.

Since an index to the records of all clinic patients is kept in the public health unit, it has not been considered necessary to have a record index in the outpatient department of the hospital.

Tabulating Reports

In conjunction with the adoption of new record forms and procedures, a report form to be used as a daily work sheet was developed.

This form calls for a minimum amount of information on service provided the individual and on place of residence and is intended primarily for the information of local appropriating bodies. Certain additional information is compiled for maternal and child health and communicable disease services to be forwarded to the State health department. Reports are summarized once monthly. It is the belief of the Kanawha-Charleston Health Department that with this system professional personnel can obtain adequate additional information by an annual case-record review and by sample studies as the need arises.

Factors facilitating such reviews or studies are:

1. The distinctive color tab affixed to the folder to denote the clinic service or services which permits ready selection of records.

2. All services received by the individual complete in one folder or, if there is no folder, on one card.

3. Simplification of forms and reduction in their number, which reduces the task of extracting needed information.

Comment

Not long after the institution of this record system its advantages became apparent. Almost immediately satisfaction was evinced by all personnel concerned with medical and nursing records. In the 18 months that the new forms and procedures have been in use only minor changes have been necessary. Thus far no serious disadvantages have been found. One of the most important advantages noted is that the complete record accompanies the individual as he or she is routed for various clinic services. As a result, the work flow is smoother and the patient is served more effectively in less time than was possible with the old record forms and procedures. It is true that the index card has proved to be somewhat larger than necessary to record the required information on a substantial number of the patients reporting for service. However, this objection would seem to be outweighed by the advantage of being able to interfile index cards and old records of the same size.

PHR *symposium*

Portland, Maine

Reexamining Health Record Forms

By EDWARD W. COLBY, M.D., M.P.H.

RECORDS AND STATISTICS go hand in hand, but since records are the source of statistics, they are basic. If these basic records lack in quality, the conclusions drawn from them will be that much less valuable.

But however anxious we are to have usable records and the statistical data derived from them, to a goodly number the recording of information is a chore to be avoided. Why? Lack of time? Yes, to some extent. Lack of interest? Undoubtedly. Too much detail may require too much effort or the recordkeeper

may discern no useful purpose for the information. Recording of information and data, unless carefully tended, may easily become merely a matter of habit. Like garbage, record procedures and forms must be reviewed and removed often to keep them from becoming obnoxious.

Change in Emphasis

It is generally agreed that records should be maintained for the purposes of: (a) providing the best possible service to individuals and fam-

ilies; (b) program planning; (c) more efficient program operation; and (d) program evaluation. In too many instances, however, records are maintained for justification—the accounting for time or the accumulation of impressive figures. The perpetuation of this fault cannot be blamed solely upon those in the profession. It must be shared by those to whom we may be responsible—the public at large, mayors, managers, councils, and boards.

To change this superficial approach to record-keeping, the health department must, perhaps, present public health to these groups in more solid and understandable terms, concentrating upon the substance from which these data are derived.

Many lengthy discussions have taken place as to how to record and account for certain activities. Consider nursing visits, for example. To the individual, family, and community served by the visit, the activity may be of major importance, as in the instance of an initial followup visit to a tuberculosis suspect. Yet when that particular visit is cumulated as a part of total “nursing visits” in an annual report, it becomes just another numeral and has no particular significance to the community.

How much would be lost if we discontinued accounting for such items as number of nursing home visits and substituted the number of nursing hours devoted to home visits, to school or clinic service, or to other special activities? This information, when related to the numbers of individuals served, would be of much greater significance to everyone. True, a long chain of precedence would be broken, for never again would that particular service be able to make a comparison with another agency on an annual basis of numbers of nursing visits alone. (If for some particular reason the number of visits

were necessary, sampling would provide these data.) Are nurses employed for the number of visits they are to make or are they employed to give a certain number of hours of service per week? The answer is obviously the latter, and it is the only basis, particularly in a generalized service, upon which performance accounting is at all valid.

Standardization

Despite many statements to the effect that “standardization of forms and records is not possible because of the variation in program emphasis from one community to another,” it is my personal contention that appreciable standardization is possible. The principles of public health are basically the same the country over, and in spite of varied emphasis standardized record forms could be used to considerable advantage. Perhaps the difficulty involves not only standardization of record forms but also the companion need of uniform nomenclature. More uniformity is possible. Witness the increasing acceptance of the Public Health Service recommended eating establishment and milk ordinances and codes, the national plumbing codes, and many of the service records relating to these. To some extent standardization has been accomplished in certain nursing records. The Public Health Service has promoted a certain degree of uniformity in tuberculosis and venereal disease service records, but much more can be accomplished in this respect.

Nearly 20 years ago the American Public Health Association's Committee on Administrative Practice named a Subcommittee on Record Forms whose “purpose was to encourage the development of a satisfactory system of records for city health work.” The workable forms drafted by the committee were edited by Walker and Randolph and published under the title of “Recording of Local Health Work.” That volume outlined basic principles concerning forms and records applicable to the programs of that day, and it has remained about the most complete reference on the subject.

A valuable aid to many local health departments, small or large, would be a central reference source from which could be obtained sample records manuals with forms and informa-

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tion regarding types of records systems. Many commercial distributors of business forms and methods seem to be of little assistance in adapting their systems to the needs of public health, although it would seem a simple matter to devise stock forms for public health similar to those available for private physician, dentist, and hospital records.

Records in Portland

The Portland health department's concern with a review of its records and records procedures began approximately 3 years ago, with a reorganization of the department. Most of the record forms of the department had been in use for an extended time. In many of them, items were being recorded as a matter of course without any particular knowledge of how the information could be used. Reasons for this were evident. The staff had not been indoctrinated in the use of the particular forms; it did not have the benefit of periodic review of forms, and no forms-use manuals existed.

For the two reasons, economy of staff time (work simplification) and to obtain more meaningful statistics for program planning and community education, a records review was undertaken. Because of the magnitude of the problem, it was decided to concentrate upon nursing and medical service records as the first step. A short-term loan of a Public Health Service records consultant was obtained to advise and assist. Following the basic step of a general study of the record forms procedures and files, a staff committee was appointed, and all proposals were discussed with the committee at frequent intervals. This procedure served not only to reconcile differences of opinion, but also served as inservice training.

Procedural Revisions

A summarization of accomplishments illustrates the value of such a study. Much time and effort have been saved by procedural revisions: transfer of certain phases of the recordkeeping process from nurse to clerk; rerouting the flow of records; redesign of work sheets and cumulative reports; and joint participation of clerk and nurses in certain preclinic records preparation. As an example, it was estimated that

formerly at least 8 percent of the total staff nursing time, the equivalent of one nurse's time, was used in the keeping of other than service records. The time now required has been reduced to but a small portion of the previous figure. The elimination of miscellaneous registers containing information on record elsewhere was in itself a timesaver.

As planned, this study is only one step toward an eventual complete overhaul of records which will result in even greater economies of time and the accumulation of more valuable statistics. Long-range planning anticipates the use of mechanical tabulating procedures such as "mark-sense" records. These will enable the health department to accumulate administrative and service statistics with a minimum of extra effort. To this end, the department's basic record review and simplification process is an essential interim step. Many of the resulting records are intentionally designed for temporary trial and error use before final adaptation to mechanical tabulation forms.

The benefit of procedural revision was clearly demonstrated after a system of hand-sort punch cards was installed for recording and analyzing vital statistics. Prior to its use approximately 2 months were required to assemble and tabulate data for the annual report. It now takes approximately 2 weeks for the same procedure.

Single Immunization Record

A single immunization record was developed which permanently records the parent's signature giving consent for both primary immunization and "booster" doses. This same record also provides for an individual's chronologic history of all immunizations. This one card replaces at least three record forms maintained for separate immunization procedures. In arranging for school immunization clinics, this record avoids the further necessity of preparing and sending home to parents separate consent slips when "booster" shots fall due.

Besides saving the costs of the several different immunization forms and consent slips and the time spent in processing all of these, this innovation also eliminated three separate immunization registers. Information recorded in these latter was actually a duplication of data already recorded on separate cards.

					P	B	B	B	P	B	
					DPT			DT		SP	
NAME					BIRTH DATE						
ADDRESS					GRADE		SCH.		RM.		
<p>I hereby request the physicians of the PORTLAND HEALTH DEPARTMENT to give my child whose name appears above, the following IMMUNIZATIONS (including "booster" doses) combined DIPHtheria-WHOOPING COUGH-TETANUS.</p>											
SIGNED											
PARENT OR GUARDIAN					ADDRESS					DATE	
Do Not Write Below											
VACCINE	DATE 1st DOSE	DATE 2nd DOSE	DATE 3rd DOSE	DATES OF BOOSTERS							
SM. Px	DATE	RESULT		REVACCINATION DATES							
PORTLAND CITY HEALTH DEPT.										SM. 9-52 D.	

New Immunization Record Card

Master-Location File

The establishment of a so-called master-location file within the sanitation unit combined records housed in many separate files. This is a general resource file for information on premises, other than those of special classification (restaurants, bakeries, and pasteurization plants). In this file, in individual 8½- by 11-inch folders arranged alphabetically by streets and street numbers, are kept all records and correspondence pertaining to a particular address, housing sanitation original inspection reports, the resultant orders issued, exchange information from fire, electrical, building, public works, and other departments. These folders contain extensive chronologic histories and, to avoid loss of papers, since they are used by several persons, a patented "corner clip" affixed to the folder binds them in place, yet makes removal and insertion a simple matter. This combination has eliminated a number of different sized card and record file cabinets and the consequent

number of places to search for information. It takes no imagination to realize the savings in time and patience resulting from the use of this centralized-file procedure.

Within the current year the city of Portland has been officially divided into census tracts for the first time. Henceforth, the health department will be able to relate sanitation and nursing services to population and environment, the more effectively to evaluate service as well as to plan future program requirements.

To those who may be concerned with the development and use of records, these simple suggestions are made:

1. Plan carefully.
2. Design simply.
3. Pretest if possible.
4. Seek assistance from practical consultants.
5. Make friends with a good printer.
6. Develop a forms-use guide.
7. Review periodically and revise when indicated.

Curbstone

Consultation:

An Effort

To Improve Communications At Annual Meetings

I. Origins of the APHA Southern Branch Experiment

By BEN FREEDMAN, M.D., M.P.H.

AS PROFESSIONAL associations have grown in size and numbers, annual meetings in particular have become more diversified and cumbersome. In the initial stages of the development of public health associations, only a small handful of enthusiasts participated. Such small and highly motivated groups had no need to be unusually concerned about methods and techniques of holding meetings.

Tradition, however, has a way of stabilizing procedures, and financial considerations are a powerful force in channeling the course of

activity. These can shackle forward movement, unless, of course, the tradition be itself in essence a conscious effort to innovate, to accept, and to adapt to change, and unless we become masters of our financial problems rather than finances becoming the master of our methods. In public health, tradition has been of a very plastic character in relation to the science of hygiene, less so in relation to the art of group dynamics. Thus, the scientific content of our annual meetings has continued to grow while the efforts to get this information to attending members have been much less fruitful.

To a large extent, this has been true because of the compulsion for getting "papers" presented and published, even though many of the papers be merely restatements of already established information and themes. This tradition has continued to grow, and the limited outlet for publication has created a bottleneck and a dilemma. And yet, there is as important a place for the presentation of elementary information as for the new without perpetuating the pressure of publishing such presentations. This is especially true for new public health workers and for the partly experienced and un-ripened field workers who are in the process of learning that which the experienced health worker has already crystallized into his store of knowledge. It is the kind of information which is best disseminated through consultation and discussion.

Dr. Freedman is director of the public health training center of the Louisiana State Department of Health and assistant professor of public health administration, department of tropical medicine and public health, Tulane University Medical School. He has taken a leading part in the activities of the Southern Branch of the American Public Health Association since 1946, as program chairman, as secretary-treasurer, as president (1950-51), and as a member of the executive committee in 1952-53.

It is our task to make a place in our annual meetings for restatement of the older and established information for those who need it without encumbering the already seasoned health workers who are seeking what is new. There are, of course, exceptional circumstances when exceptional individuals may present interpretations of old ideas in a new and enriching manner.

What is needed, then, is not fewer meetings but a better adjustment of the dynamics of holding meetings patterned to the purposes for which particular meetings are held.

The Needs of Field Workers

The Southern Branch of the American Public Health Association has centered its interest primarily on the public health field worker. It has, therefore, been incumbent on the Southern Branch to devise methods of holding meetings which would best serve the field workers, and which would make the annual professional meetings both opportunities for the active participation of most of those who attend and profitable public health experiences for those who participate.

The purpose of annual meetings should coincide with the interests and needs of those for whom the meetings are held. For the majority of public health field workers, the most common reasons for going to meetings could be classified as follows:

The need that professional workers have for talking over their problems and sharing their local successes with colleagues from other localities and with recognized specialists and authorities.

The mental and emotional stimulation they get in anticipating the atmosphere of good fellowship and in experiencing the unexpected—effects which are reflected in performance on the job.

The need of individuals to expand their sphere of participation in the activities and achievements of public health work, particularly to participate actively in professional meetings in order to satisfy their ego, to widen

their sphere of acquaintance, to develop a broadened viewpoint, to accumulate experiences, to learn new trends—all of which develop confidence and build competence.

The feeling that they will gain a better perspective of their specialty in relation to the total public health picture, and the need to feel part of a larger community of interests to which a portion of one's life has been dedicated.

If the majority of public health field workers go to annual meetings for at least some of the above purposes, then the planning, the organization, and the operation of the meetings will require a more dynamic approach. All, or most, of the expectations of the membership necessarily must be satisfied and members must be stimulated and helped to meet in productive manner for discussion of their problems.

The First Curbstone Attempt

No one in a professional field is unaware of the inherent vitality of the annual meeting or of its shortcomings. A large assembly is more often than not charged with the atmosphere of hide-and-seek, despite the fact that much which is there is valuable and useful. In such an atmosphere in 1950 was born the idea of "curbstone" consultation. Could not public health consultants man booths similar to the commercial displays and exhibits seen at many association meetings? Could not they exchange information there with their colleagues who seek a heart-to-heart discussion of the routine problems which the formal presentation of papers seems not to touch?

The idea caught on. Some weeks later it was adopted by the program planning committee of the Southern Branch for its 1951 meeting in Biloxi, Miss.

The informal designation of curbstone consultation was used to describe this approach, with the hope that the informality of the method would secure flexibility and adaptability. Since a start had to be made, the Biloxi meeting was geared to the following plan:

A list of 50 public health subjects thought to be of interest to field workers to be selected and classified in accordance with the major interests of the various sections of the parent American Public Health Association.

In the same manner as scientific and commercial exhibits operate, each subject or group of subjects to have a booth; those representing subjects relating to a particular section to be arranged in proximity.

Each section chairman to be responsible for obtaining enough consultants to operate each booth. Depending on the nature of the subject matter, there should be enough consultants for each booth so as not to tie down any consultant over too long a period, since each one would probably also have need for seeking consultation.

Consultants for each booth to develop their own method of operation, being responsible for bringing their own visual aid materials, technical demonstrations, or printed matter.

Each booth to have at least one table and several chairs and to be supplied with a registration book.

Each section chairman to be responsible for having placards made for each of his section booths, indicating the names of the consultants serving each booth at a particular time.

An overseer or manager for each booth to be designated from among the consultants who would meet for a short time before the curbstone session in order to plan such administrative details as the sequence in which the consultants would take their place in the booths.

Out of a 2½-day meeting, a full day to be devoted to curbstone consultation.

This plan, of course, was designed to meet the general needs of field workers. Specifically, it was hoped it would—

Give broad participation to field workers.

Give firsthand personal contact between Association members from different States in an organized, orderly, and expeditious manner.

Give a real opportunity for exchange of ideas and personality impressions.

Bring the timid more easily into participation.

Provide a better opportunity for general and specialized information exchange.

Make most people feel their importance in the community of health workers.

Breed confidence in those who might feel themselves lacking in the opportunity for broadened contacts.

Bring together on a favorable basis those who have had the opportunity to contribute to public health with those who are becoming the future contributors.

Bring into more favorable light those who deserve recognition.

Stimulate those who were chosen as consultants to organize their knowledge about their subjects and to develop their abilities to impart their knowledge to others.

The Plan in Operation

The section chairmen were key figures in developing the *modus operandi* of this first attempt at curbstone consultation. They were supplied with an outline detailing their responsibilities and those of consultants and booth managers and setting forth some of the details of arrangements. Consultants were urged to get at the preparation of materials as early as possible. Special attention was given to materials to be used in the consultation process. The following were specifically suggested:

Articles, pamphlets, outline notes, worksheets, and the like, which describe new methods of approach to problems, new techniques, means of evaluating programs, and any other tools which could be of practical use to the field worker.

Placards carrying provocative questions concerning practical field problems.

Technical demonstrations that would be interesting and informative to the membership.

Audiovisual materials for demonstrating aspects of work which could be adapted by field workers.

Section chairmen were advised further that an announcement would be made at the first general session of the meeting describing the purpose of curbstone consultation and how it

would operate. Consultation periods were scheduled for an afternoon and for the following morning.

Naturally, there was some misunderstanding and apprehension on the part of those making the arrangements and of the consultants. Even the essentially mechanical matter of arranging the booths to the satisfaction of the consultants was not easy. Some booth spaces were too small and too far removed from the flow of traffic. Signs and placards were not all ready and satisfactory. Some booths were spaced too closely, and others lacked needed equipment and facilities. The commercial booths were separated from the consultant booths and were located conspicuously away from the flow of traffic. Some booths had to be dismantled too early in order to prepare for other activities. Nevertheless, the crowds that attended the booths were encouraging, and most individuals who were not concerned with the operations appeared to be having a refreshing experience.

Lessons From Biloxi

No plan for evaluating the curbside consultation part of the program had been set up. However, every section chairman and consultant was asked for observations that would contribute to better planning in the future. Many other individuals were asked for similar pertinent criticism. Much was gleaned from this unorganized method of evaluation; and, indeed, many flaws in the method of organizing the program were brought to light. However, with few exceptions the response was enthusiastic and exciting. Most individuals were convinced that this method or a similar dynamic organization, when developed more smoothly, would definitely meet the needs of the field workers.

A meeting was called several weeks after the Biloxi meeting to evaluate the criticism and to make recommendations to those who were to organize the next Southern Branch meeting in the spring of 1952 at Baltimore. Recommendations dealt both with the general approach and with details of administration. It was suggested, for example, that 2 half days be devoted to curbside consultation on the second day of

the meeting. Planning, it was thought, should be handled by a chairman and committee, and the planning phase should be extended. Also, more advance information about the plan should be made available, including names of consultants and their topics and schedules. Southern Branch members should be briefed at section meetings prior to the consultation day. If possible, section meetings should be tied in with consultation in such a way that questions remaining unanswered could be referred to the proper consultation booth. The membership also should be informed of their own responsibilities as well as of the personal advantages to them in participating in the consultation process; that is, they should be prepared to raise questions and discuss their own problems and experiences.

It seemed sensible to reduce the number of consultation booths or topics to a relatively few functional and subject-matter categories, each precisely defined. Consultants should be asked to make an effort to find out as much as possible about each other's topics so that useful referrals could be made, should spend at least 2 hours on duty, and should report to the chairman their experiences and suggestions for further development.

As for physical arrangements, temperature, ventilation, and lighting were found to be important. Booths should be easy to locate, well marked, attractively arranged to permit a degree of privacy in consultation. The booths should be set up before, not during, the meeting. They should be stationary and not subject to interference from other activities. Commercial and scientific exhibits should be placed in the same general area, or at least in the stream of traffic, and exhibit materials and means of posting signs and displays should be provided.

Although the recommendations resulting from the evaluation of the Biloxi meeting supplied a few new items which were adopted for the 1952 Baltimore meeting, the new circumstances of the latter meeting brought forth new ideas and new experiences which were quite unexpected and exciting, thus underscoring again that flexibility and adaptability are the essence of the curbside consultation technique.

II. Three Years' Experience With Curbstone Consultation

By WILLIAM P. RICHARDSON, M.D., M.P.H.

ALTHOUGH there have been many criticisms and suggestions with respect to details of plans and arrangements, there has been universal and enthusiastic approval, by all who have participated, of the "curbstone" consultation technique pioneered by the Southern Branch of the American Public Health Association since 1951. Some of its advantages are immediately apparent. These, and the history and philosophy of the idea, have been well stated by Freedman in the preceding report.

This discussion is devoted to an analysis of experience at the three meetings where curbstone consultation has been used—Biloxi, 1951; Baltimore, 1952; and Atlanta, 1953. Because the technique was new, a deliberate effort has been made to try different methods of organization, and it is believed that sufficient experience has been gained to provide some guidance to those who may wish to consider its use.

Perhaps the most difficult problem in developing a curbstone consultation program is that of physical facilities. The original concept was that spaces or booths similar to those used for commercial and scientific exhibits should be provided. While this concept has value so far as the general plan of arrangement is concerned, it was soon apparent that the spaces needed to be much larger than conventional booths. The consultation often assumed the form of a roundtable or group discussion involving 10 to 20 or more people, so the area provided had to be sufficient to seat that number.

Seriously complicating the problem of space

and arrangements is the fact that few hotels or auditoriums have sufficient available space to provide for curbstone booths in addition to the usual commercial and scientific exhibits and general and sectional meeting places. Thus, it becomes necessary to set up booths in areas used at other periods for regular meetings. The time required for conversion must be considered in planning the schedule. The provision of stands, screens, or curtains for separating the spaces may also create difficulties, and it is essential that this need be anticipated and arrangements to meet it be made well in advance.

It has been the experience of the Southern Branch that ideal or even nearly ideal arrangements cannot be expected, but with careful planning, arrangements that are reasonably satisfactory can usually be worked out. A decision that sometimes must be made is whether to use some very satisfactory individual spaces which may be available at considerable distance from the main area. In our experience it has proved better to group the booths in the same general area, even though by so doing some of them will not be quite so satisfactory in space and appointments, because isolation is a severe handicap.

The period devoted to the curbstone consultation program also provides a splendid opportunity to visit the various exhibits, and to this end it is helpful if the curbstone area is fairly close to the exhibit areas.

The most satisfactory arrangement worked out has been to set up 2 rows of booths in a large meeting hall or ballroom, separated by heavy curtains or screens, preferably 6 feet high, providing space of approximately 12 by 14 to 14 by 16 feet. If it is anticipated that most booths will not have more than 8 or 10 participants at a time, the size of the spaces may be reduced somewhat and provision made for the availability of 2 or 3 rooms capable of accommodating 25 or 30 people to which groups which outgrow the booths can be moved. It is preferable that the booths not be too small, however, because size helps to mitigate noise interference and foster the illusion of privacy. Basic equipment needed is a table, chairs for the consultants, 15 or 20 chairs for those seeking consultation, and a sign indicating the consultation

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topic. The sign is most advantageously displayed on a small stand or easel.

Patterns of Scheduling

The Southern Branch meetings are of 2½ days' duration. We have experimented with both the time relationship of the consultations to other features of the program and with the plan of scheduling subjects and consultants. At the Biloxi meeting in 1951, where the curbstone feature was first introduced, the consultation period was scheduled on the first afternoon after a morning general session, and again on the second morning, followed in the afternoon by section meetings. At the 2 subsequent annual meetings, it was scheduled from 9 a. m. to 3 p. m. on the second day. No other technical sessions were scheduled for the day, and no recreational activities were planned until after 3 o'clock. This second schedule worked somewhat better than the one at Biloxi. However, the suggestion has been made, and probably will be incorporated into the plan for another year, that it would be helpful to have a general session, perhaps 1½ hours in length, on the morning preceding the curbstone program. With the day's program consisting of only the informal consultation feature, many people tend to get scattered. Having a brief formal session of general interest first might counteract this.

Another significant factor to be considered in planning the schedule is the form the consultations are expected to take. The original concept was almost exclusively in terms of a single individual seeking advice and assistance in regard to his particular problems.

In practice, the process has more frequently turned into group discussions involving a number of individuals. These have proved to be popular and most worthwhile, but there has been the complaint that they did not allow the opportunity for desired individual consultation. This problem has not yet been solved. For the next annual meeting, it is proposed to divide the consultation time into 2 periods of perhaps 2 hours each. During the first 2 hours, there would be general consultation, usually on a group basis. During the second 2 hours, there would be individual consultation by appointment only. Appointments could be made for

15-minute periods by signing a sheet available at the booth or at the registration desk during the first 2-hour period.

Topics and Consultants

For the Biloxi meeting, a list of general topics was compiled, and each section chairman assumed responsibility for getting consultants for the group of topics which fell within the area of interest of his section. In general, one consultant was selected for each topic, and he was delegated to get other consultants. As a result, many of the more widely known workers in the region were asked to participate in consultation on as many as 6 or 8 topics, and there was much confusion. For the past 2 meetings, detailed planning has been concentrated in a small committee and has actually been handled largely by the chairman. This has thrown a heavy burden on this one individual, but it has made for much more effective coordination and balance.

Under this procedure, section chairmen made specific suggestions as to consultants and subjects, and the committee canvassed association officers and other public health leaders in the various States for additional suggestions. The committee then worked out a tentative list of subjects and consultants, and either issued invitations to the proposed consultants directly, or asked the section chairmen to assume this responsibility for specific individuals. In some instances, section chairmen have assumed responsibility for obtaining consultants on specific subjects, but the chairman of the curbstone committee has received copies of all correspondence so that conflicting invitations or misunderstandings were avoided.

Experience has led us to favor considerable flexibility as to selection of subjects. At the Biloxi meeting, topics were quite general and broad; for example, "local public health nurses," "venereal diseases," "maternal and child health." At the Baltimore meeting, much more specific topics were selected. Many of these were further broken down into three sub-topics, each of which was scheduled for a 2-hour period and was covered by a team of 2 or 3 consultants. At the 1953 meeting in Atlanta, the topics were both general and specific, and teams of 6 or 8 consultants were assigned to each booth

for the day. It was left to a designated booth chairman to work out a schedule which would keep at least 2 consultants at a time on duty without imposing too long a period of service on any individual. This latter plan seems preferable.

The number of topics is determined not only by the need for covering subjects considered to be of widespread interest but also by the space which may be available. In most places where meetings with a membership the size of the Southern Branch (under 1,000) are held, it is unlikely that available space will accommodate more than 18 or 20 booths. Such limitation on numbers requires careful selection of topics. One device which has been of value is to frame the subjects so they will be of interest to several professional categories of people, and to have each category represented on the consultant team.

With respect to selection of topics and consultants, it is advantageous to use both recognized authorities who will be consulted because of their reputation, regardless of the assigned subject, and workers who may be relatively unknown but who have developed a successful program, activity, or technique about which others would like to know. In general, it enhances interest if it is known that a consultant has been selected because of special achievement or competence in the area of the consultation topic. One important source of consultants, of course, is the participants in the general and section programs.

Another factor with which we have experimented is that of displays and exhibits. Originally, all the emphasis was on consultation, and eye-catching exhibits were not encouraged. We have come to the conclusion, however, that here again it is well to allow considerable flexibility and to leave to the judgment of the consultants whether displays or exhibits, or even slides or films, may contribute to the consultation function. A measure of variety makes the program of greater overall interest and attractiveness, provided the fundamental concept of consultation is kept in mind.

Instructing Consultants and Participants

There are several specific details of planning which are important to assure understanding

and smooth functioning. One of these is the provision of a sheet of information and instruction for prospective consultants. Many who are asked to participate will be relatively unfamiliar with this kind of program, and it is helpful for them to receive, at the time of invitation, a sheet describing the program, its purposes and general method of operation, the facilities which will be available, and exactly what is expected of consultants.

This information should be followed by a meeting, which has been scheduled in advance and included in the printed program, of the consultants and the section chairmen with the curbstome consultation committee. At this meeting, last-minute instructions can be given, final details as to plans and arrangements explained, and an opportunity to clarify specific points provided.

An important part of the success of the program depends on intelligent participation by those desiring consultation. To this end, a brief description of the plan is included in the printed program, and the curbstome chairman is given an opportunity at the first general session to explain the process and make any last-minute announcements. In addition, a 2-page mimeographed folder has been distributed, giving somewhat more detailed description of the process, specific arrangements for the current meeting, and suggestions for getting the most benefit from the consultations. Specially designed evaluation sheets or questionnaires are also distributed to provide a systematic means of getting reactions to various aspects of planning and arrangements and suggestions for improvement. These evaluation sheets have furnished many of the ideas which form the basis for changes and improvements from year to year.

Enthusiasm for Program

The membership of the Southern Branch seems enthusiastic about the program innovation of curbstome consultations. Plans are to make them a continuing feature of the annual meetings, modifying and developing details of plan and procedure from year to year as experience may indicate. There have been rough spots, as would be expected with so new an undertaking, but these have been minor in comparison with the interest the programs have

stimulated and the growing evidence of their utility.

The curbstone plan appears to work well for professional meetings the size of the Southern Branch, but it may not be feasible for meetings of larger size. For larger meetings, it could, of course, be used as a feature concurrent with other program features, provided that satisfactory space and arrangements are available.

Success with the program depends on comprehensive planning and careful attention to

the details. It is hoped that other organizations will try the curbstone consultation plan, experiment with various ways of doing it, and make their experiences available to other professional groups. There is strong conviction that this innovation has a significant contribution to make to meetings such as those of the Southern Branch, but continuing experimentation is needed to determine the most effective techniques and to define more exactly the methods, limitations, and usefulness.

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The Partnership in Dental Health

By NELSON A. ROCKEFELLER

WHEN the Department of Health, Education, and Welfare officially came into existence last April 11, it lifted the vital health, education, and social welfare functions of the Federal Government to Cabinet rank. For the first time in our national history, these social responsibilities are represented at the highest council tables of our Government. Health, education, and social welfare have become an integral part of the considerations of the President's official family.

I think this is a logical outgrowth of President Eisenhower's beliefs which center around deeply held convictions concerning the dignity and worth of the individual. His actions in the field of social welfare are a striking example of this humanitarian philosophy.

To him, as to all of us, the problems of peace and war, of international freedom and stability, come first; for there is no individuality for Americans who are threatened by war or tyranny. Next are economic stability and growth at home—the ingredients without which individual growth is impossible. These are the cornerstones of President Eisenhower's foreign and domestic policies—freedom and peace on the international front, and economic stability and growth on the domestic front.

Mr. Rockefeller is Undersecretary of Health, Education, and Welfare. He presented this address, here somewhat condensed, before the 94th annual meeting of the American Dental Association at Cleveland, Ohio, September 29, 1953.

But there is a third element, an element which is encompassed in the broadest meaning of the term, "social welfare." The President has shown in his deep awareness of the fact that all three are inseparably formed together in a free society. The individual develops to his fullest capacity as a member of society only with the background of the best possible educational training. He must enjoy good health—physically and mentally. He must be secure in the knowledge of his protection in the event of extreme hardship, disability, and old age.

The Common Goal

In the field of dentistry and related subjects, the interests of the Department of Health, Education, and Welfare and of the American Dental Association touch at many points. The Department works with many professional associations toward the common goal—better health for each of our citizens. The Department works, of course, in different ways, using different resources and under different patterns of authority. But the objectives are shared objectives and many of the problems are mutual ones.

The Department, as you know, recognizes dental health as a matter of tremendous national importance. We are aware of the many complex and interrelated factors involved—manpower shortages, inadequate appreciation of the significance of dental health, the staggering backlog of accumulated dental needs, and economic barriers to dental care and services.

In this community of interests it is possible

to identify at least three sets of problems which are matters of immediate concern to the dental profession as well as to Government.

First, and perhaps foremost, is the problem of dental education and the needs of dental schools.

Secondly, there is the need for research in the various aspects of dentistry.

Finally, there are the problems involved in the application of scientific knowledge. In other words how can we make sure, within the framework of American principles of free choice, that the benefits of modern research and modern resources reach the majority of the people?

Before considering each of these issues in greater detail, it might be well to redefine the dental health responsibilities which are vested in the Federal Government. The Department operates under laws passed by the United States Congress. This is a basic fact too often misunderstood by the health experts and the public with whom the Department cooperates. As a Federal agency, the Department can do only what the law authorizes. A voluntary or professional health organization, as well as the private practitioner, can do anything the law—and their code of ethics—does not forbid. The distinction is an extremely important one and must be understood to appreciate the interactions of government and private agencies.

Most public dental health services today are provided by local governments. Federal responsibility is limited to research and experimentation, consultation, demonstrations, and, in some instances, to financial participation through research grants and through grants-in-aid to the States and local communities. Through these grants the Public Health Service and the Children's Bureau assist in the development and support of State and local dental health programs. The grants are administered by the localities according to their own needs and patterns. In theory and practice, therefore, the States and the Federal Government act as partners, each contributing to the job of improving the health of the American people.

The basic authority for the bulk of the Department's dental health activities is Public Law 755, passed by the Congress in 1948. This law, as you know, created in the Public Health

Service a National Institute of Dental Research. It directed the Public Health Service to "conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of dental disorders and conditions"; to "promote the coordination" of dental research; to provide fellowships and traineeships to qualified young research workers in dentistry; and to "cooperate with the State health agencies in the prevention and control of dental diseases and conditions."

The Problem of Dental Education

The Nation's dental schools are in or are confronted with serious financial difficulties. A recent estimate of the need, based on data collected jointly by your Council on Dental Education and the Public Health Service, indicates that the schools require \$43 million for construction to relieve overcrowded classrooms, expand clinics, and develop research programs; \$6.9 million to purchase equipment; and, not counting amounts reported as deficits, an additional \$8.2 million for adequate annual operations. Many schools rely excessively on part-time staffs, especially in the clinical departments.

Unless the financial status of dental schools is improved, the problem will have grave consequences for the quality and quantity of dental service in the future. More adequate support of dental schools seems clearly indicated to forestall any deterioration in dental education.

Potential sources for these funds, which need more exploration, are gifts from individuals and foundations and from industry. Recently, American industry has taken an active part in supporting the medical research effort of the Nation. It is an extremely significant and praiseworthy development. Members of the dental profession themselves, in the interests of good citizenship and the advancement of their high calling, can do much to enlarge the support of dental schools from all these sources.

The problem of dental education is basically, however, the problem of the university schools of dentistry. Here, the dentists of the future receive their basic training and education. Adequate facilities, resources and teaching per-

sonnel are necessary for both research and education in the field of dentistry. Continuing efforts must be made to provide adequate support to dental schools and institutes of research, because it is from these institutions that scientific advances in dental health will be made. The quality of dental care in the future, as in the past, will stem from these advances in both research and education and from their translation into preventive dentistry and dental practice.

Within the State and regional communities can be found the energy, the resources, and the know-how to solve these problems. It is not the job of local government alone; or of the local society alone; or of the practicing dentist alone; or of local philanthropy and civic enterprise. All of these groups and agencies, working together must—and can—find the answers.

The role of the Federal Government in the field of professional education is primarily one of fact-finding and analysis, stimulation and guidance. Federal subsidy or compulsory national health insurance is not the solution.

Expanding Dental Research

The problem of expanding dental research is related to, and, in part, a consequence of the financial crisis in dental education. The American Dental Association recognized early the potentialities of research in terms of dental health benefits to the Nation. With funds derived from its membership, it supported the establishment of fellowships at the National Bureau of Standards, the Armed Forces Medical Museum, and the National Institute of Dental Research.

These modest investments have paid rich dividends. For example, the research undertaken cooperatively by the American Dental Association and the National Bureau of Standards has developed processes and materials which have been widely adopted by industry. The research output of this program is followed eagerly by scientists of other nations, and it has had worldwide application.

Since the passage of Public Law 755, the Federal Government has been able to help in this field. Dental research in the Department

of Health, Education, and Welfare now ranges from basic physiological work to analyses of dental practices and of administrative patterns of organizing dental care.

Research studies include work on oral bacteriology and diseases of the soft tissue. Through the use of the electron microscope, the National Institute of Dental Research has advanced our understanding of the nature of dental decay and of the cell structure of dental tissue.

Another Departmental study is the Public Health Service's investigation of the use of chair-side dental assistants to increase the productivity of the individual dentist as well as the total output of dental services. Many dentists are already availing themselves of the services of trained assistants with decided effect.

The Public Health Service's 14-story Clinical Center at Bethesda, Maryland—which combines facilities for basic laboratory research and large-scale clinical observations—has set the stage for a fully integrated study of the major health problems of man. The Center contains facilities for research in the clinical aspects of dentistry and will enable our dental scientists to conduct studies on patients, with the help of basic research developed in earlier years. Projects are already under way in the study of oral tumors. Others are contemplated in the prevention, diagnosis, and treatment of dental diseases. Our aim in this research—as, indeed, in most of the Department's research—is to find and make available to the private practitioner the tools and techniques which will enable him to do a better job.

Probably the best known research is that which established a relationship between the amount of fluoride in water supplies and the extent of dental decay, and the subsequent and continuing work on the prevention and control of dental decay through fluorides.

But Public Health Service research has gone beyond the dental effects of fluorides. Data have been accumulated on the general effects of fluorides on the functioning of the body, and we are acquiring considerable engineering and chemical information on the water fluoridation process. In fact, one recent finding has been the demonstration in the laboratory that even under extraordinary conditions of mineral or

dietary stress, fluorides in the recommended concentrations do not become toxic.

The Public Health Service is continuing its own research and is watching closely the work of others in this field. We intend to leave no stone unturned in our constant vigilance to protect the public health and safety of the people of this country. I am delighted to see, in view of our findings and those of other research workers, that the American Dental Association has taken the lead in this field of public health. Research offers seemingly limitless possibilities in the control and prevention of dental diseases. The Federal Government has played, and will undoubtedly continue to play, a significant role in dental research.

The challenge to the profession is clear. Knowing the seriousness of dental disease and its costly impairments to health, the profession must seek to stimulate new interest on the part of individuals, foundations, and industry in the problems of dental health. There are many avenues for research which hold great promise that can and should be explored.

The Application of Scientific Knowledge

The application of valid research findings must be hastened, and the best possible dental care must be available to all people.

Our earliest knowledge of dental needs stems from a survey of 1½ million children which the Public Health Service carried out in collaboration with the American Dental Association in 1933-34. I cite this not only as the earliest instance of cooperation between our organizations, but also as a particularly good example of the kind of teamwork in which we believe. The Public Health Service worked closely with some 8,000 local dentists, with State and city departments of health and education, and with State and local dental societies.

As to the Nation's unmet dental needs, the best available evidence suggests that despite the universal occurrence of dental disorders, less than one-third of the population receives anything approaching adequate dental care each year. Although more than \$1 billion was spent for this care by Americans in 1952, it

remains true that many millions of our citizens are either receiving no care or, at best, very limited services.

The opportunity to secure dental care is a fundamental need of every individual. The ideal of dental care for all, however, cannot be realized immediately. Good sense suggests that we place greater reliance upon local initiative and interest. Aggressive support and participation by the community are essential ingredients.

Various experiments have been undertaken which demonstrate the almost limitless potentialities of this idea. Consider, for example, how one small community in Minnesota, with no resident dentists, made dental care available to all children, regardless of income or geographic location. A revolving fund from contributions by families of the community was set up. Interest-free loans to needy families were made for the purpose of financing children's dental care. The families have free choice of any 1 of 6 private practitioners in the county, who provide the care in the school dental office of the community. This is a dramatic example of how a local community voluntarily mobilized its resources to meet a local need.

One largely rural State, North Carolina, recognizing the need for additional dental manpower, appointed a dental college committee as long ago as 1921 to press for the establishment of a dental school within the State. The concrete results of that effort will appear in 1954, when the school graduates its first class. The yearly addition of 40 to 50 dentists will appreciably increase the supply and tend to equalize the distribution within the State. In addition, this State has displayed energy in organizing treatment of underprivileged children by private practitioners and has given thought to scholarship assistance to residents to attend dental school.

These are but two examples among thousands of what can be done through local leadership to provide adequate support for dental care in accordance with the need at the community level. It is a great challenge—a unique opportunity for initiative and imagination in the service of one's fellow men.

Agenda for a critical exploration of Current Problems in Medical Care

By E. M. BLUESTONE, M.D.

Here is a catechism—but with questions only. The author draws here upon his extensive experience in hospital administration and his pioneering work at Montefiore Hospital in New York to ask, cogently and incisively, the perplexing questions current today in the fields of hospital and medical services administration. When originally presented last December his audience was United Community Services of Metropolitan Detroit, but his "agenda" is for all who plan and direct the course of health and medical affairs in private and governmental hospitals, in public health, in social service, and in the civic and official organizations of the community. From them the answers must come.

THE MODERN STUDENT of medical care seems almost to be laboring under an embarrassment of riches these days, so much successful experimental material is at his disposal. Social and medical possibilities are clamoring for conversion into actualities at such a rapid pace that the planner is left breathless in the process. We shall have to excuse his enthusiasm on the one hand and his disappointment on the other when he finds the going slow. Opposition must be met, satisfied, or overcome. New problems are sometimes created as old ones are solved. The best example of this seeming paradox is found in the lengthening of the life span, which, however desirable, brings with it the necessity for making the later years comfortable. The problem in procedure is therefore how to apply new remedies for old difficulties and how to find additional remedies—an unending chain.

The most extensive, and perhaps the most dif-

ficult, of the basic problems is the one the patient exhibits when he is suffering from prolonged illness, whether he is ambulatory, bedridden, or alternating between the two. Here is an exceptional case in which the solution of one major problem automatically liquidates a great many others. Relieve the chronic difficulty and the acute difficulty will be relieved in the process. Since one of the penalties of greater longevity is that it takes a longer average time to die than ever before, we are all the more constrained to deal with this manifestation intensively. That the approach is social, economic, and political, as well as medical, goes without saying. The family and the environment play a major role in any consideration of such a subject. Preventive medicine and environmental medicine hold many keys that are ready for use.

Listed here are some of the items on the agenda of unfinished business, with explanatory

notes, for the consideration of the participants as they deliberate such questions at the council table. Each of these items calls for decisive action and each requires a combination of social and medical techniques in research, which are at our disposal, ready for study and application.

1. We need a definition of such terms as "acute," "chronic," "convalescent," "custodial," "aged," "hospital," "home," "curable," "incurable," "social medicine," and "socialized medicine." At the moment, the sick man suffers patiently while those who plan for him too frequently permit themselves to be confused by these terms.

At what point, for example, shall we separate acuteness from chronicity? Can we establish a common denominator for the two and use it for all practical purposes? What is the impact of duration of illness on the provision of medical care, and does the service correspond to the requirements of the case? How is a convalescent patient distinguished from a so-called chronic patient? Is there any advantage in providing for the elderly separately and apart from all other social and medical services? Or is it better to identify them with all other age groups in accordance with their social and medical needs? When are we justified in labeling a patient "custodial" with regard to medical care? At what point, if any, during the course of illness is a hospital justified in dismissing a patient and transferring him to less capable hands?

It is easy to see how hospital policy can be revised and formulated on a more equitable basis when such questions are answered correctly and in absolute terms in relation to each other.

2. The trends in medical care for each of these definitions need stating, particularly with reference to prolonged illness (formerly known hopelessly as chronic disease) and the aging process. Most of these are well known, even though we resist their full acceptance, while others still wait to be brought to public view in a practical way. There is, for example, the continuing trend toward finding new ways of closing the gaps in hospitals between (a) acute and chronic; (b) income and expenditure; (c)

space demand and space supply; (d) social service and medical service; (e) intramural and extramural care; (f) current medical economics and the science of medicine; and (g) principle and practice generally.

This involves the consideration of such things as voluntary prepaid insurance plans, including group medical practice; home care for those who do not require a hospital bed; and substitutes for the patient's home under the medical jurisdiction of the hospital for those who do not require a hospital bed and cannot be taken care of in their own homes, either immediately or by subsidy of one kind or another. The outpatient department's services will have to be considered; provision of doctors' office space on hospital premises; the integration of tuberculosis and mental disease in the work of the general hospital; the principle of full-time medical service in hospitals; the shifting emphasis in medical education; and the reunion (including the integration) of health and medical care. The obvious purpose in appraising these trends is to apply them productively to plans for medical care.

3. We need an evaluation of social and medical pressures, tensions, and resistances in connection with illness in all its forms. What is the quality and quantity of these individual and communal phenomena emanating inside or outside of the hospital? Are they well based, honestly applied, and helpful? How much anxiety, as well as eagerness, is associated with them, and, if these pressures are well-founded, how shall we deal with the resistances which they may create? The answer to this question will take us beyond the realm of statistics. Workers in the field are constantly exposed to these manifestations and are sometimes caught between the proverbial millstones. This subject must be treated at the council table with statesmanlike understanding.

4. A practical formulation of the scientific requirements in the management of prolonged illness is needed. This refers both to medical necessity and to social necessity, evaluated with scientific accuracy wherever possible, but with the realization that a sick person must never be subjected to the rigid standards of the exact

sciences. Scientific requirements go beyond the goal of certain well-meaning philanthropists who feel that food, shelter, and clothing (custodial care) are all that may be required by a person who has the misfortune of living under a prognosis of incurability.

5. We need a forceful statement on the menace of rigidity in hospital planning, and this refers to function as well as to structure. In particular, we must be alert to this menace when we plan for prolonged illness, because rigidity commits the hospital "in bricks and mortar" over a long period of years during which adaptations will undoubtedly be required. One of the architectural problems is how to get flexibility of design so that adjustments to changing conditions may subsequently be made easier.

6. We need a reaffirmation of the principle of individualization of care for patients under all circumstances. There is now the possibility of home care programs, which, in turn, stimulate greater interest in individualizing the care of patients who have no choice but to enter a hospital.

7. Among the supporting statements for the various items on this agenda should be a well-reasoned critique of the older and still prevailing methods of dealing with prolonged illness in homes, hospitals, and elsewhere. Only on the basis of such studies will revised plans for patient care find acceptance. We must be sure that we are dissatisfied with what we have and profit from experience before we adopt substitutes. A conservative point of view requires the strongest hypothesis to justify any kind of experimentation.

8. The criteria for admission to any hospital will have to be redefined and restated in the light of the deep-seated changes which the laboratories of modern medicine have been offering. Having emerged from the prescientific era, we are now in a position to get a better turnover of hospital beds or offer them to patients for longer periods, as necessary—so long, in fact, as they may have to remain close to the highly concentrated diagnostic and therapeutic facilities of the hospital. The new resource of

home care can relieve the hospital of the necessity for retaining any other kind of patient within its walls.

9. As the policies which govern the admission of patients to general hospitals are rewritten, we should, at the same time, outline the criteria for the retention of the patient in his own home. Under what circumstances is he best cared for in this way?

10. Another item on the agenda is a recommendation on the criteria for the transfer of a patient, either from the hospital or from his home, to a substitute for his home. If a home for the aged, like a so-called home for incurables or a nursing home, should be a substitute for the patient's own home, then we should restate the conditions under which guests may be admitted and retained in these establishments. We must, however, keep in mind that these institutions are substitutes for the patient's home and never for the hospital.

11. The time has come to restate the special criteria for admission to homes for the aged. If we are to discontinue the practice of establishing so-called hospitals within homes for the aged, there is all the more reason for revising the conditions for admission. In the rare instances in which a home for the aged has been able successfully to establish a hospital within its walls, it has in fact added another hospital to the community. In order to establish a hospital within a home, the institution must be prepared to meet the challenging clinical problems which characterize prolonged illness and age in general. It should be able to absorb acute medical and surgical cases without further effort. Such an institution is indeed compelled to do this in emergencies. In connection with this item we must consider the relationship of a home for the aged, which as I have already pointed out is a substitute for the patient's own home, to the general hospital from which it should be able to draw medical sustenance.

12. What criteria shall we recommend for admission to custodial establishments generally? These decisions should follow the lines

recommended for an institutional home for the aged.

13. If, after careful study, we find that it is virtually impossible to maintain a convalescent establishment solely for this specific purpose, what shall we do about it? This establishment, too, is a substitute for the patient's home and not a substitute for the hospital. If a convalescent patient is safely on the road to partial or complete recovery from acute or chronic disease, his requirements will doubtless be about the same as those for anyone who is recuperating from overwork and seeks a change and rest on a farm, in mountainous areas, or at the seashore. We must not confuse the convalescent patient with any other type of patient, for if we do, we shall perpetuate a confused and distorted plan of medical care which makes of the convalescent institution a catchall establishment for the admission of patients (with the possible exception of mental and tuberculous patients) who may not be acceptable to the "acute" general hospital.

14. Though much is being said about the place of the tuberculous patient in the general hospital, we are still far from translating this principle into practice. How can the care of the tuberculous patient be integrated with the care of all other patients in the general hospital and what conditions should govern his admission? The active treatment of this disease, based on modern scientific knowledge, and the passive treatment, which characterized the care given previously and still being given, should be evaluated from this point of view.

15. Almost the same questions apply to the mental patient in the general hospital. What are the relative advantages of integration in a general hospital as compared with isolation and segregation in a distant special hospital? If integration is desirable, what is the best kind of experimental beginning and how can the hospital trustee be made receptive to such new ideas?

16. If integration is not accepted as a wholesome trend in the management of the tuberculous or the mental patient, what alternative

structural and functional plan can we safely fashion? Specifically, we have yet to express ourselves firmly on the place of the mental patient in (a) the mental institution, (b) the home for the aged, (c) the home for incurables, (d) the nursing homes, and (e) all other custodial types of institution. Much of this applies to the tuberculous patient. To what extent is it desirable to alienate either of these patients from the environment generally, to which they will be expected to return, and their families.

17. An essential part of the study of this pressing and vital problem is an item about the significance of a waiting list of patients for admission to a hospital and rejected applicants for admission. What is the effect of a waiting list on hospital morale as well as on the patient himself? At this point there must be an offer of alternative methods of care. This study would be incomplete without a thorough analysis of rejectees in any medical establishment. A hospital must not only know and understand what it does, it must know and understand what it does not do, and then help to make good the difference.

18. No study of medical care can be complete without an analysis of the relationship of housing in the community to the program of hospital care. Throughout the ages at least one reason for the existence of the hospital has been the inadequacy of home facilities during certain phases of illness. Such an analysis would lead into a field of study which would produce, in the end, far better use of hospital beds than we have thus far seen, while individualizing the care of the patient outside as well as inside of the hospital.

19. The requirements of good chronic care as seen from the angle of social (environmental) medicine should be considered carefully. A clear statement should be issued after careful study of these requirements, and facilities should thereafter be adjusted to meet these requirements. Specifically, is the home for incurables, home for the aged, convalescent home, nursing home, or hospital for chronic diseases, the best place for this kind of patient? If so, why? If not, why not?

20. How shall the vicious circle between poverty and prolonged illness be broken? At what point does a person require the kind of assistance, social or medical, which will prevent poverty from precipitating prolonged illness and prolonged illness from precipitating poverty? In the long run, they do their deadly work together.

21. What standards should be recommended for the establishment of substitute homes for the homeless patient and for the home-poor patient when intramural hospital service is not indicated? Should medical facilities be added to these substitute resources and, if so, to what extent? If not, how can these substitute homes be related to the work of the general hospital? In some instances only a custodial type of care is required, but in more instances continuous medical care is required. If general hospitals transfer their undesired patients to less capable hands at a time when scientific medical care is most needed, how shall this practice be controlled?

22. In the analysis and the evaluation of the reasons for the current practice of transferring patients from the so-called acute general hospitals to second-class institutions, we should deal specifically with (a) the financial reason for transfer, including a statement of remedies; (b) the medical reason, including a statement of remedies; and (c) lack of space, including a statement of remedies.

23. How shall we define and evaluate for practical purposes such new terms as "geriatrics" and "gerontology" in relation to medical care? What are their possibilities and what are their limitations? Is geriatrics a separate specialty like pediatrics, or a problem in acute illness or prolonged illness as the case might be? In other words, at what point in the calendar of a man's life are we justified in making any kind of arrangements for his medical care that may deprive him of the best that is available to those who were born into the world after him?

24. What is the relative emphasis that is being placed on various phases and stages of ill-

ness and, in particular, the duration of illness? To what extent does the pressure of urgency dominate planning and how much consideration can be given to nonurgent conditions, which may, in fact, be far more frequent and far more devastating in their prolonged effects?

25. An important item on the agenda is the need for placing responsibility for correct and up-to-date planning. Who is responsible when a person is deprived of the kind of social and medical care that he may need at various critical periods in his life? There must be a level at which responsibility can be fixed. What is this level and how shall it be controlled?

26. Since prolonged illness characteristically exhibits diminishing financial returns from patient sources, how shall we make up the social and medical deficit to enable us to restore the sick man to partial or complete usefulness in his community? What are the relative positions of government and philanthropy in an effort like this and what is the position of the practicing medical profession toward this financial problem which involves them automatically? Can we buy medical time and medical interest with money and with opportunity? If so, under what conditions?

27. As we deliberate on the question of financial currency in relation to the care of the patient, we should give some thought to clinical currency. Specifically, to what extent should such a subject as prolonged illness influence medical education and medical research in the hospital, in the home, and in the substitute for the patient's home?

28. An important item on the agenda is an open-minded study of the principle of full-time medical service in the top clinical and laboratory divisions. What are the relative merits of full-time hospital service and the kind of prevailing voluntary service in hospitals which compels intramural and extramural competition for the service of physicians?

29. Since the poor may always be with us and since the intermediate type of institution—too often a substitute for the general hospital—

will doubtless prevail for some time to come, what structural and functional obligations shall we impose on it? I refer here specifically to the possibilities of preventive medicine at one end and rehabilitation at the other.

30. What responsibility shall be assigned and what agency shall publicize any new patterns which may evolve? What methods shall we recommend to obtain the acceptance of the public generally as well as interested persons specifically?

Omitted from this presentation are those problems in political economy which, to be sure, have a strong bearing on the agenda. While I am concerned primarily with good medical care for everyone, regardless of age, social condition, duration of illness or the illness itself,

environmental medicine teaches that employment and a good economic background are prime factors in preventing disease or its consequences. Business and industry have a strong contribution to make in prevention, first by the application of the principles of industrial hygiene and occupational medicine, and second by encouraging a program of rehabilitation that will enable the recently sick to return to work. Fortunately, much successful experimental evidence is available to enable us to reach decisions on most, if not all, of the items enumerated in this agenda. We are left, therefore, with the need for adjusting the social and medical resources evolving patterns of care. Needless to add, there are many opportunities for additional experimental work on a continuing basis until problems like these can be resolved.

Public Health Service Staff Announcements

Dr. Sidney Farber has been appointed to serve on the National Advisory Cancer Council of the Public Health Service for 4 years beginning October 1, 1953. Dr. Farber is the scientific director of the Children's Cancer Research Foundation, Boston, professor of pathology at the Harvard University Medical School, and chief pathologist of the Children's Hospital, Boston. Since November 1947, Dr. Farber has served the National Cancer Institute of the Public Health Service as a special consultant on clinical research problems. He is well known for research on the chemotherapy of cancer in children, particularly leukemia.

Dr. Floyd S. Daft has been named director of the National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, by the Surgeon General of the Public Health Service. Dr. Daft, acting director of the Institute since the retirement of Dr. Russell M. Wilder on July 1, 1953, had been assistant director of the Institute and chief of laboratory research since 1951. A member of the scientific staff of the National Institutes of Health since 1937, he has directed nutrition studies, particularly on the B vitamins, and conducted a study of the substance later identified as folic acid. His in-

vestigations have contributed to the understanding of dietary deficiencies causing anemia, cirrhosis of the liver, and other metabolic diseases.

Dr. Maurice C. Pincoffs has been recently appointed to serve on the National Advisory Arthritis and Metabolic Diseases Council by Surgeon General Leonard A. Scheele of the Public Health Service. Dr. Pincoffs has been professor of medicine at the University of Maryland since 1922, and is president of the Medical and Chirurgical Faculty of Maryland, regent and a recent president of the American College of Physicians, and councilor and ex-president of the American Clinical and Climatological Association. For many years, he has been editor of the *Annals of Internal Medicine*.

Dr. Russell S. Boles, internist and gastroenterologist, Philadelphia, and **Dr. Thomas P. Almy**, associate professor of neoplastic diseases, Cornell University Medical College, have been appointed to the Cancer Control Committee of the National Cancer Institute, Public Health Service. Their 4-year terms are effective October 1, 1953. Dr. Boles succeeds **Dr. Charles F. Branch**, Lewiston, Maine, and Dr. Almy succeeds **Dr. Edmund G. Zimmerer**, Des Moines, Iowa.

Psychiatric Rehabilitation in the Community

By RICHARD H. WILLIAMS, Ph.D.

ANY FULL-SCALE PROGRAM in psychiatric rehabilitation must concern itself not only with what can be done for mental patients in the hospital (1) but also with what actually happens in the community. What services, if any, are given, and what might be done after the patient leaves the hospital?

It would indeed be fortunate if a mental patient could leave the hospital with the mental disease either cured or arrested, and also be completely "rehabilitated," so that he could at once assume his optimal role without further help or specialized attention. Such is obviously not so, in fact. Adequate statistics on rates of readmission to mental hospitals are not available. We do know they are high. It is a fair guess that they are significantly higher than they might be with concerted rehabilitative efforts in the hospital and in the posthospital period. In New York State, for example, one-third of all admissions to mental hospitals in 1947 are readmissions (2). Readmission rates, where available, may underestimate the

problem, however, because patients returned from convalescent care or from some status other than full discharge may not be counted.

The extent of rehabilitation cannot be fully measured by readmissions because the patient may fall considerably short of his optimal social role even if he succeeds in remaining out of the hospital. Still more basically, it can never be expected that all patients can be fully rehabilitated on leaving the hospital, because the protected hospital setting is, of necessity, significantly different from many of the situations to which patients return.

Efforts can and have been made to simulate pressures of the outside world in hospital settings. For example, patients may be put through a graduated series of work tasks in which more and more rigid scheduling is involved. But the patient is still "protected" in the very special hospital sense, and there is the problem of readjustment to more normal social situations.

The Meaning of "Community"

Psychiatric rehabilitation has already been defined (1). But what is meant by "psychiatric rehabilitation in the community"? The term "community" is used in a variety of meanings. Within the social sciences, it can be used broadly and analytically to refer to persons who share or participate in something in common, for example, a community of language.

It may be used more narrowly to refer to persons who share the basic conditions of a common life, for example, geographic territory,

Dr. Williams, social science research consultant with the National Institute of Mental Health, National Institutes of Health, Public Health Service, discussed the psychiatric rehabilitation of mental patients in the hospital in the November 1953 issue of Public Health Reports, p. 1043.

Public Health Monograph No. 17, a review of the literature on rehabilitation of mental hospital patients, is being concurrently published with this issue and is summarized on p. 1237.

basic educational, medical, and other services.

It can be used still more narrowly to refer to people who share the basic conditions of a common life and who identify themselves as a primary group. In this last sense, many people do not actually live in communities today, and the most typical examples of communities would be found in peasant villages, or among certain nonliterate people.

The term "community" is frequently, and on the whole rather loosely, used in discussions of problems of health and welfare. It is often difficult to pin down just what is meant, other than known interactions between clients and specific health and welfare agencies.

For present purposes "community" will be defined very broadly and residually to refer to whatever nonhospital setting patients go on leaving the hospital. This definition is broad because little is known about what the "community" is and what it means to former mental hospital patients. An important, initial step in posthospital rehabilitation research is precisely to determine the dimensions of the community to which the patient returns. In a general way, it may involve his relations to a family, a job, a circle of friends and acquaintances, his participation in various organized groups or in civic affairs, and his identification with smaller or larger local groups, including his nation. As research proceeds, community functions and structures as they affect the life of the expatient can be identified much more exactly.

Subdividing the General Problem

A fundamental first step in adding to knowledge of rehabilitation in the community is to make a detailed analysis of the real social world to which a patient returns, whether or not a formal intervention by health or welfare agencies occurs. We need to know:

The type of family, if any, to which he goes back.

The degree of his isolation from, or participation in, primary groups (family, close friends, cliques).

His relation to the occupational world and many other aspects of his group identifications.

The informal institutions, basic cultural

forces, and commonly shared attitudes into which he plunges.

The major objective is not to document these situations historically for each individual patient but rather to determine general patterns which affect large numbers of patients and to assess the rehabilitative or illness-producing values of forces within these patterns. Ultimately, the objective is to find modes of intervention which will increase the rehabilitative value of the total situation. This phase may be called the basic analysis of community structure and functioning.

What kinds of treatment, assistance, or support do patients need after leaving the hospital? These include emotional support, assistance in various kinds of economic and occupational adjustment, and help with living arrangements and social activities. A basic question is the optimal amount of support needed, for there can undoubtedly be too much as well as too little support, and disfunctional passive-dependent attitudes might develop.

How, and by whom, can the treatment, assistance, or support best be supplied? What should the role of the hospital and of the various hospital personnel, such as psychiatric social workers, be after the patient has left the hospital? What kinds and amounts of clinic facilities are needed? What is the extent of the role of the vocational rehabilitation agency? Probably various agencies will be involved in the total rehabilitation process, and effective coordination of their efforts is an important aspect.

What kinds of information—through what channels, to what audiences—might build up communitywide attitudes which would facilitate the rehabilitation process? Basically, what can and should be communicated to whom? A considerable body of general knowledge has been built up in the field of communications research, but, as yet, it has not been systematically applied to problems of rehabilitation.

Some Plans for Analysis

There are a few people throughout the country who have developed some empirical knowledge or who have had some professional training in relation to these problems. However,

we are far from having a systematic body of knowledge about psychiatric rehabilitation in the community which could be communicated and utilized in program development.

As a first step in this direction the Public Health Service's National Institute of Mental Health has recently made a grant to the Harvard School of Public Health to explore the problem and to develop a research design for a full-scale analysis of the Whittier Street area of Boston.

This area, as described by the staff at Harvard, has been the focus of considerable and continuing ecologic and demographic analysis and is currently being used for training and research by the Harvard School of Public Health in cooperation with the City of Boston Health Department. Thus, much of the costly background investigation has already been carried out.

Previous analysis showed that the area has a population of about 60,000, includes a wide distribution of cultural and socioeconomic groups in its 11 census tracts, so that it is possible to compare one subgroup with another. There are three main ones: a very low economic group, primarily Negro, with a stabilized population and a high illness and accident rate; a predominantly Irish working class group, with a stabilized population and a moderately high illness rate; and a middle-class apartment house area, with a geographically mobile population and a low illness rate. Preliminary analysis suggests that annually approximately 100 patients from the Whittier Street area are admitted to Boston State Hospital alone. An equivalent number are presumably discharged from the hospital.

Research techniques in the Whittier Street area will include observation and interviewing in the field, as well as the use of statistics and intensive case studies. During the pilot study phase there will be opportunity to develop and suitably adapt sociologic and anthropological techniques and concepts for this particular type of research. The socioecologic and illness-incidence information already available on the population of the area should provide a strategic baseline for intensive analysis and efficient sampling in the selection of patients and families to be interviewed. It should thus be possi-

ble to compare patients' families with socially and culturally similar families to disclose possible significant variables in interpersonal structure and emotional climate contributing to emotional or mental disorder in family members.

Research of this type should contribute not only to a better understanding of the problems of rehabilitation as such and furnish a sound basis for program development but should also add significantly to basic understanding of sociopsychological factors in mental disorders.

Bridging the Wide Gap

There are, and probably always will be, basic differences between the structure of the hospital and the structure of social situations into which patients go when they leave the hospital. There is growing awareness that at present the resulting gap between the hospital and the community is quite wide indeed. This "psychological distance," as Schwartz calls it in Public Health Monograph No. 17 (3), may well account for the relatively large number of failures among discharged patients on the one hand, and for reluctance to discharge many other patients on the other hand. Thus, if the gap could be narrowed or, better still, actually bridged, there could be significant increases in the number of successfully rehabilitated mental patients.

The several ways in which this gap could be bridged may be classified into four main areas, each one of which will require major efforts in research and program development.

The Hospital Itself

Changes within the hospital, including administrative changes, the addition of rehabilitative services, and increased interaction between the hospital and community could make the gap less extreme. There is already a tendency for mental hospitals to be less isolated geographically and socially. There are efforts to bring in more of the outside world as patients are ready for it. Hospital personnel are becoming more aware of working closely with other agencies in the community.

The Patient's Immediate Contacts

It should also prove valuable, while the patient is still in the hospital, to work with the

people who are "significant persons" to the patient—his family, friends, employer, minister, and the others. They could be better prepared to receive the patient and to foresee the problems he will have when he returns. Also, by this same process, much could be learned concerning the patient, his problems, the situations from which he has come, and the situations to which he could or could not return.

Transition Rehabilitative Services

Direct rehabilitative services to the patient after he leaves the hospital could lessen the more extreme changes and severe adjustments in making the transition to a nonhospitalized pattern of life. This could include provision of outpatient clinic services for continued therapy or emotional support, the services of the vocational rehabilitation agency in providing counseling, guidance, placement, and, for some patients, training, services for family counseling and guidance, and possibly others.

The Halfway Shelter

Increased facilities of the character of a halfway house to act as a very specific bridge may prove to be highly desirable and valuable. Schwartz (3) has analyzed several such attempts, and Jones (4) has described a number of arrangements of this type found in different countries. They may take the form of special living arrangements where expatients can find some protected shelter and mutual support, plus a minimum of professional help. The expatient can begin employment, contribute to his own support, be much less of a burden on public funds, and learn gradually to live in the outside world.

Expatient clubs without living arrangements can also be of value. They have been tried with some success in England and on a smaller scale in the United States. Provision for foster homes or other kinds of home care with one or sometimes more patients present in the household also appears feasible and valuable. On the basis of past experience, it is particularly important to have careful selection and preparation of the family and of the expatient, and to have good but not overdone publicity by press and radio to build receptive attitudes in the community generally.

Sheltered workshops can be a valuable bridge in the occupational sphere and provide, as well, a more permanent place for patients who may never be able to function in most occupational settings. But, again, research of the general type indicated above should provide important guidelines for the development of any of these plans or for several of them in combination.

Adjusting to the Community

On the other hand, we should at least be aware of the possibility that for some patients the gap between the hospital and the community may be in a sense not wide enough, or in another sense, of a very special type.

Take, for example, the situation of the patient living in an open ward. He has ground privileges and can go downtown on occasion. He may have made some close friendships and developed group identifications within the hospital, but he may also have lost all contact with family and friends on the outside. He may have achieved a satisfying vocational adjustment in one of the hospital industries, and, of course, he has an assured place to sleep and three meals a day. He has, in effect, brought the "community" into the hospital. Any other "community," on the "outside," would have little, if any, appeal, and might even be quite frightening. Such an adjustment may be fairly "good" from the point of view of the patient but costly to the taxpayer.

How can a program motivate such patients to move on into a more independent and productive status, without doing something to destroy the values of improved hospital care and improved inhospital adjustment? This problem, too, must be faced in any operationally significant research on rehabilitation on mental hospital patients.

Developments in Vocational Rehabilitation

Small but important beginnings have been made in furnishing the services of State vocational rehabilitation agencies to persons with mental and emotional handicaps. Since the passage of Public Law 113 (78th Cong., 1st sess.) in 1943, several States have developed

specialized programs for psychiatric clients. In some States, a vocational rehabilitation counselor has been assigned full time to a mental hospital. In other States, increasing numbers of such cases have been added to the general caseload. Rennie, Burling, and Woodward (5) have estimated that about 15 percent of the patients who leave mental hospitals need the services of vocational rehabilitation. This figure has been cited frequently since the publication of this pioneering study in 1950. It may underestimate the potential use of such services because of the relative newness of the vocational rehabilitation program and because of the relatively small numbers of cases on which experience has been built thus far. In any event, less than 15 percent of these patients are receiving such services now and there is room for much development in this field.

The National Institute of Mental Health, in collaboration with the Office of Vocational Rehabilitation of the Department of Health, Education, and Welfare, has recently been active in stimulating special training programs for vocational rehabilitation counselors who are working with or who might work with mental patients. Three institutes were sponsored during 1952-53 and three more are planned for 1953-54, making it possible in each of these years for each State to have at least one member of its staff to attend. An analysis has also been made of the background of some of the people working in this field. They were found to be an unusually mature, stable, and highly motivated group. They are beset by many of the strains of a new profession, particularly the strains of budget. There tends to be some pressure to increase the numbers rehabilitated, because dollars-and-cents justification is possible and does make sense in this work. But, by and large, they have developed some very successful programs. However, it was also found that there are urgent needs for further training and research results and for more effective utilization and coordination of all resources in the community. Much of the success so far is based on the practical experience of individual counselors and a few empirical and commonsense principles which have not been systematically explored or analyzed in readily communicable form.

Some Indications of Payoff Value

Rehabilitation can and does pay off in dollars and cents. It can produce substantial savings in costs of hospitalization and even more substantial savings in increased earning power of rehabilitated patients, and, hence, a more effective utilization of our national manpower. Furthermore, rehabilitated patients pay taxes on their earnings which offset the costs of vocational rehabilitation services.

Numerous figures have been compiled for vocational rehabilitation in general, for example: "The 60,000,000 disabled persons rehabilitated in 1950 added an estimated \$93,000,000 to the national income the first year they were rehabilitated—more than three times the amount expended for rehabilitation services in the same period and about five and one-half times the annual rate of \$17,000,000 earned by these individuals at the time they were accepted for service" (6).

Figures indicating costs and savings in the total rehabilitation of mental patients have not been compiled. However, in an analysis made of one State program by the National Institute of Mental Health, it is clear that savings through vocational rehabilitation of mental patients were substantial. In the first 4½ years of the period analyzed, during which a vocational rehabilitation supervisor was assigned full time to the State hospital, 238 cases were closed as rehabilitated. The rehabilitated patients earned a total of \$256,304. This figure would give a fictitiously low average, because a number of the patients counted had been out of the hospital and earning salaries only a few weeks at the time of the study; the average weekly wage is about \$50. The costs of keeping them in the hospital during the period they were employed and out of the hospital would have been \$449,222. Thus, there was a gross gain in values produced and in savings of \$705,526. If we estimate that they paid 15 percent of these earnings in various taxes, there was a tax return to the public of \$38,445, or a gross gain to public funds of \$487,667. The program cost \$6,478 in direct services to clients (tuition for training, and other costs), and \$46,358 for guidance and professional services, or a total of \$52,836. If we attribute all of the

hospital savings to the program, there would be a net gain of \$434,831 in public funds. Some of these patients would have been out of the hospital without the program. However, we only need to attribute about 5 percent of the hospital savings to the program to have it pay for itself in public funds alone, and undoubtedly the program accounts for several times this amount.

These figures look, and are, convincing. However, too much insistence on this type of argument is likely to create pressure to turn people out in quantity. Cases are sometimes closed too soon and cases which do not need service are taken in order to make a better record. We should always bear in mind that we are not producing machines on a mass production basis. Rather, we are attempting to help people lead more satisfactory lives which in turn create many intangible values not only for themselves but for those with whom they are associated. Some of these values are more difficult of measurement. However, it seems quite safe to conclude that programs in reha-

bilitation have a very high potential payoff, both in terms of values which can be measured directly in dollars and in terms of the less tangible human values which cannot be so measured.

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Cancer Control Letter Discontinued

Publication of the monthly *Cancer Control Letter* was discontinued, by direction of the Bureau of the Budget, with issue number 67 dated September 1, 1953. The National Cancer Institute of the Public Health Service had issued these reports as a service to public health officials, voluntary health agencies, educational institutions, and others concerned with cancer control activities and techniques. Every effort will be made to supply the information furnished previously by the Letter through publication in *Public Health Reports* and other publications and agencies.

The Literature of Rehabilitation Of Mental Hospital Patients

Within the past few decades personnel working with hospitalized mentally ill patients have increasingly shifted the conception of their purpose from custodial care to reeducation and reintegration of the patient into his community. They have become more aware of the necessity for treating the patient as more than a carrier of a disease entity. The new concept of rehabilitation of the mentally ill is the rubric under which a wide variety of activities is carried on. However, despite the growing body of published reports regarding rehabilitation practices, there has been no general survey of the literature in this field. Public Health Monograph No. 17 reports an analysis of 189 selected articles in this field published in the United States between 1944 and 1952.

Writers have defined "rehabilitation" in various ways, depending upon their purposes and viewpoints. Rehabilitation has been conceived of as the activities which bring about patients' recovery, the process by which patients recover, the goal of the services provided, or a phase of the treatment given. In this report an operational definition was used. Rehabilitation is defined by indicating what is being done to aid patients to function outside a hospital setting. The report does not cover specific medical therapies or psychotherapy.

Five questions are considered:

1. What is the unit of rehabilitation? In other words, what aspects of the patient or patients must be considered in a rehabilitation program and what are the number, kinds, and organization of personnel necessary to carry on rehabilitation services? Five currently used approaches are described: the individual approach, the team-individual approach, the pa-



Public Health

MONOGRAPH

No. 17

The accompanying summary covers the principal points discussed in Public Health Monograph No. 17, published concurrently with this issue of Public Health Reports. The author is with the National Institute of Mental Health, National Institutes of Health, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

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Schwartz, Charlotte Green: Rehabilitation of mental hospital patients. Review of the literature. Public Health Monograph No. 17 (Public Health Service Publication No. 297). 76 pages. U. S. Government Printing Office, Washington, 1953.

tient group-individual staff member approach, the patient group-staff team approach, and the interpersonal relationship approach.

2. What is the process of rehabilitation? The differences in the conceptions of how rehabilitation occurs are pointed up by classifying activities in terms of the major focus of the writers. It is shown that relationship therapy, patient-patient relationships, group psychotherapy, psychodrama, group discussions, therapeutic social clubs, group work, and patient government are mainly conceived in terms of the interpersonal relationships involved. On the other hand, occupational therapy, music therapy, art therapy, recreational therapy, and corrective therapy are conceptualized primarily in terms of the activities involved. Attempts to combine both approaches in total push programs are examined.

3. Which staff attitudes toward patients are thought to be therapeutic and which are considered nontherapeutic? The ways in which patients are affected by these staff attitudes are delineated.

4. Which aspects of the hospital social structure are thought to be related to patient improvement? The following areas of hospital structure are examined: the degree of democratization of the structure, the channels of communication, the definition of the functions of hospital personnel, and the atmosphere of the ward. In addition, the effect of the hospital physical plant on patients is indicated.

5. What ways are used to bridge the gap between the protected environment of the hospital and the more unprotected existence of community living? The approaches which can be instituted while the patient is in the hospital and those which might be instituted after the patient returns to the community are suggested.

Throughout the monograph, attention is focused on core problems faced by rehabilitation workers and, on the basis of activities thus far conducted, suggestions for further research are advanced.

From THE CHILD

Of Public Health Interest

In the November 1953 issue, Margery D. McMullin, executive director of the Handicapped Children's Home Service in New York City describes how "To Keep Up Home-Bound Children's Morale" by recreational activities which are stimulated by "volunteer" visitors to the homes.

And John G. Hill, research director of the Health and Welfare Council, Philadelphia, considers the question, "Can Cost Accounting Help Social Agencies?" He describes the experience of the Family Service of Philadelphia in analyzing its unit costs of service and mentions that the family agency, one of the 10 largest in the United States, is publishing a cost study manual. (Copies may be purchased upon publication by addressing the agency at 311 South Juniper Street, Philadelphia 7.)

Also in the same issue, the efforts of a local committee in bringing community health and education services to the families of mi-

gratory agricultural laborers in Fresno County, Calif., are described by the committee's vice chairman, Mrs. I. H. Teilman.

In the October 1953 issue, Dr. Anna L. Philbrook, director of the New Hampshire State Child Guidance Clinics for the past 10 years, discusses emotional problems of the crippled child, in an article based on her report at the 18th New England Health Institute. She writes, "We should not let the crippled child depend on us too much, but rather we should show him that we are aware of the force of health that is in him. Let us give that force a chance to strengthen itself . . ."

The Child will be changed in name to *Children* and issued bimonthly beginning with the January-February 1954 issue. The subscription rate is \$1.25 a year (\$1.75 for foreign mailing). Single copies are 25 cents each. The publication is issued by the Children's Bureau, U. S. Department of Health, Education, and Welfare.

An Analysis of Ratbites In Baltimore, 1948-52

By WILLIAM SALLOW

THE PROBLEM of persons being bitten by rats is often superseded by the more pressing problems associated with rodent control. If the situation were merely mechanical, the treatment of a laceration or wound, while important, would not be too significant. However, when the rat is so closely associated with man that it can bite him, the possibility of disease transmission exists from the vectors present or from such pathologies as leptospirosis, salmonellosis, or ratbite fever.

The establishment in May 1947 of a separate division of rodent control in the Baltimore City Health Department resulted in focusing attention on the incidence of ratbites as an important phase of a control program.

The data presented in this report was accumulated by the division of rodent control on a citywide basis. Hospital records were checked wherever possible, and each victim or his family was interviewed. A previous study by Richter in 1945 (1) was based on data from a limited area of approximately 2 square miles, known in Baltimore as the Eastern Health District. The differences between the data of the two reports can be attributed to the greater scope of the present report.

Ratbite Case Reporting

In Baltimore, a city of more than 900,000 persons which at one time had a rat population thought to equal the human population, there is no provision for the compulsory reporting of ratbites. No cases of ratbite were reported prior to January 1948, but in that year a total of 14 ratbites from 14 separate locations was reported to the division of rodent control. Of this total, 36 percent of the ratbites were re-

ported by the police, 50 percent by relatives or friends, 7 percent by the admitting hospital, and 7 percent by miscellaneous sources. On the other hand, 42 percent of the cases were treated at a hospital.

Of 322 ratbites tabulated between January 1, 1948, and December 31, 1952, hospitals reported 31.7 percent of the cases to the health department, thus leading in the reporting as would be expected, since 231 or 71.7 percent of all the persons bitten were treated in hospitals. Parents and relatives reported 21.7 percent of the cases. Private physicians treated 8.4 percent of the bites but reported less than 1 percent of the total (table 1).

These statistics, however, do not reveal the true picture of the great improvement that has been accomplished in reporting. In 1948 hospitals reported 7 percent of the ratbites, and in 1951 more than 54 percent of the reports came from this source. The figures for 1952 again show more than 50 percent of the ratbites were reported by hospitals. The reporting by physicians, while not as spectacular in improvement, continues to show an increase. Approximately 15 percent of the reports were from within the health department, the cases having been discovered by sanitarians or public health nurses. The police have been invaluable in their assistance by reporting over 13 percent of the bites.

All such information is secured without benefit of a definite requirement for reporting and can probably be attributed to the educational activities of the health department as well as the excellent cooperation of the hospitals and the others involved.

Ages of Victims

Children 6 years of age or less are the predominant victims of ratbites. Approximately 60.5 percent (195) of all victims were in this age group, and 24.8 percent (80) were infants less than 1 year old. An additional 11.2 percent (36) occurred in children from 7 through 12 years of age; 6.2 percent (20) occurred through the age of 21, while 16.1 percent of the total were reported for persons over 21. In approximately 6 percent of the cases no age was reported (table 2).

Mr. Sallow is chief of the division of rodent control, sanitary section, Baltimore City Health Department.

Table 1. Agencies reporting annual totals of ratbites

Reporter	Total		1952		1951		1950		1949		1948	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
Hospital.....	102	31.7	52	52.0	32	54.2	12	15.0	5	7.2	1	7.0
Parent or relative.....	70	21.7	14	14.0	8	13.5	24	30.0	24	34.8	-----	-----
Police.....	45	13.9	18	18.0	6	10.2	12	15.0	4	5.8	5	36.0
Occupant, friend or neighbor.....	20	6.2	3	3.0	-----	-----	6	7.5	4	5.8	7	50.0
Health department san- itarian.....	18	5.6	4	4.0	1	1.7	4	5.0	9	13.0	-----	-----
Health department nurse.....	19	5.9	4	4.0	2	3.4	6	7.5	7	10.2	-----	-----
Visiting nurse.....	11	3.4	0	0	3	5.1	6	7.5	2	2.9	-----	-----
Physician.....	3	.9	1	1.0	1	1.7	1	1.3	-----	-----	-----	-----
Miscellaneous.....	34	10.6	4	4.0	6	10.2	9	11.2	14	20.3	1	7.0
Total.....	322	99.9	100	100	59	100	80	100	69	100	14	100

In approximately 80 percent of the cases, the victim was bitten while asleep, generally in the very early morning. Of course, incidental bites have occurred through inadvertence, as for example, a policeman who was bitten on the ankle while interrogating a householder, or the young school boy who chased a rat and caught it.

Thus it can be assumed that the next Baltimorean to be bitten by a rat will probably be 6 years of age or under, possibly an infant of less than 1 year. He will be treated at a hospital, which will then report the case to the division of rodent control. Chances are the victim will be bitten on the finger or hand, for 161 of the bites covering the 5-year span of this report were on hands, fingers, or arms; 68 were on legs or lower extremities, and 70 on the head or about the face.

More than the average number of ratbites occurred from June through November with a peak during July and August. February has been the month of least activity, closely followed by January and December. In 1951, however, bites in January and February were higher than the monthly average for that year, and no bites were reported in June. Thus, experience to date has indicated that ratbite occurrences are not predictable on a seasonal basis.

Geographically, 90 percent of the ratbites reported have occurred within 2 miles of the center of Baltimore. There is a well-defined area of occurrence west and northwest of the business district, another slightly smaller area east and

still a smaller clump south of this district. The business district, on the other hand, remains relatively free with but 1 or 2 reported cases in the 5-year period. These areas in which ratbites occur are in general "the blighted areas" of the city.

In an attempt to draw an analogy between ratbite occurrences and complaints by the public concerning rat infestation an apparent ambiguity is presented. More persons complain about rats from outside the ratbite area than from within it. Therefore, the assumption may be drawn that in these bad areas, the inhabitants are either complacent about the rat problem or unaware of the assistance afforded by the municipality. Relying on experience, the inclination is toward the former assumption—these people apparently are not too concerned about rats as an immediate problem of daily existence.

Rodent Control Operations

As the cases of ratbite are brought to the attention of the division of rodent control, a sanitarian is assigned to investigate each case. A complete inspection of the property involved is made and a survey of adjoining properties and the exterior of the entire block is completed. As a general rule, the premises on which ratbites occurred were found to be moderately to heavily rat infested.

A random selection of cases indicates rats usually entered cellars or basements through

defective or rotted doors or window sills and open unscreened basement windows. The heaviest rat infestations were found under wooden floors constructed over dirt surfaces in basements. Crawl spaces, varying from 6 inches to 3 feet deep, under a portion of the ground floor where basements were not fully excavated were also heavily infested.

Once the rat has gained entry and has established a harborage, its progress throughout the remainder of the premises is in direct proportion to the interest the occupants have in eliminating it and the abundance of food that is available. The rat migrates to the kitchen for obvious reasons and as it builds up a family, it occupies more of the house than man. The rat uses available areas such as spaces behind walls and between floors. In addition to structural harborage, it can be assured of such incidental homes as those provided in trash and debris and "saved" materials stored in basements, closets, and occasionally in an attic.

All necessary corrections to accomplish rat-proofing, rat eradication, and improvement of sanitation are instituted under the guidance of the health department. On the infested premises in which ratbites occur, eradication measures must be undertaken immediately by "competent persons," and the division requires notification of the time and the manner of such procedures. Improvements in sanitation and ratproofing must be accomplished within a time limit prescribed by the notice. The notices may be pursuant to the general nuisance abatement ordinance or the provisions of the Ordinance on the Hygiene of Housing.

Dangers From Rats

Where rats become so intimately associated with man that they share the same abode and

leave their mark on the anatomy of man, disease implications are apparent. "Where the mean temperature is 45° or less, fleaborne diseases appear to be occasional, accidental, and self-limited" (2). Fortunately, Baltimore is well north of the average winter temperature zone of 45°. Nonetheless, in this city it is possible to import flea-infested rats which find harborage in warm basements.

It was just such an "accidental" situation which occurred in late 1946 and early 1947 when 7 cases of endemic typhus with 1 fatality occurred in a crowded row of houses not far from a local railroad line (3).

No evidence of plague in Baltimore could be found by complete search of city health department records. However, as recently as early 1951, a case of ratbite fever (*Spirillum minus*) was diagnosed in a local hospital, and in 1951 and 1952 the first 3 cases of Haverhill fever were recorded (4).

The presence of *Leptospira* in significant proportions in the rat population has been demonstrated in local studies (5) and confirmed by several cases of leptospirosis. Although typhus, plague, and leptospirosis are not transmitted by ratbites, it is well to consider the three diseases whenever rats live in close proximity to persons. The role of rats in ratbite fever, also known as Haverhill fever, has been defined by the authorities with the exception of the occurrence of sporadic cases of Haverhill fever without recorded reference to ratbites (6).

The high percentage of ratbites occurring in children 6 years of age and under gives some cause for reflection. Why the preponderance of victims in this age group? Is it possible that rats sense the defenselessness of the very young? Perhaps these occurrences can be at-

Table 2. Annual number of ratbites within age groups

Year	Under 1 year	1-6 years	7-12 years	13-21 years	Over 21 years	Age not determined	Total
1948	1	5	0	0	0	8	14
1949	20	26	7	6	3	7	69
1950	18	26	9	6	16	5	80
1951	16	19	8	6	10	0	59
1952	25	39	12	2	22	0	100
Total	80	115	36	20	51	20	322

tributed to some extent to carelessness or neglect by parents in failing to cleanse the child after feeding and before putting him to bed. Many persons have reflected on this problem without providing more than theoretical assumptions. Only through the continued and concerted efforts of the health department directed toward eliminating those environmental factors that favor rat propagation and rat life can we hope to reduce the occurrences of ratbites and the potential ratborne disease hazards.

Summary

Baltimore does not require reporting of ratbites. However, through education by health officials and the excellent cooperation of hospitals and other agencies, this information is now being obtained.

Children 6 years of age or less are the predominant victims of ratbites and the incident usually occurs in the early morning while the victim is asleep. Most often the victim is bitten on the arm or leg. Although not predictable on the basis of present limited data, the peak season for these occurrences appears to be during July and August, and a steady de-

cline is noted to a low in February. Ninety percent of the ratbite incidence takes place within 2 miles of the center of the city. All are investigated and corrections are required by the Baltimore City Health Department's division of rodent control.

The close association of rat to man, as demonstrated by many ratbites, causes reflection as to the potential of ratborne diseases.

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Municipal Sewage Treatment Plant Construction

Contracts for 204 projects to abate water pollution and conserve water resources, with a total expenditure of \$64.6 million, were awarded by municipalities during the second quarter of 1953.

Of the 204 projects, 118 are for new plants and 86 are for additions, enlargements, or replacements of existing facilities. Individual projects range in cost from over \$22 million for the city of Miami proper for a new plant to \$1,590 for improvement in San Francisco.



Programs and Problems in Professional Education And Inservice Training of Health Personnel

The evaluators find that the cooperative health programs of the Institute of Inter-American Affairs and the Latin American Republics have made no greater contribution toward the advancement of health and sanitation than through their training and education activities. To hundreds of individual Latin Americans, these activities have meant greater opportunity for the cultivation and exercise of their natural talents. To their countries, they have meant higher levels of technical competence and informed leadership for health and sanitation work.

TWO BROAD PRINCIPLES guided the evaluation of the training and education activities of the bilateral health programs:

1. Well-trained personnel are an indispensable part of the foundation upon which strong and effective organizations are built. Even with a good program, reasonably adequate

funds, and a satisfactory plant, the services provided will be no better than the competence of the operating personnel. The persons responsible for the establishment of the *Servicios* in Latin America were fully aware of this principle, and from the beginning training was accorded a high priority.

2. Training is part of the whole fabric of health services. Training of personnel and provision of facilities for its utilization are in reality a single problem, for if training is not to lose its primary purpose, which is to assure good services, personnel when trained must have a place for employment.

This review of training and education in Latin America is the ninth in a series of excerpts from the Public Health Service's report of its evaluation of the Institute of Inter-American Affairs bilateral health programs undertaken during the decade 1942-52. Information concerning the evaluation survey and the origin and structure of the bilateral health programs can be found in the September 1953 issue of *Public Health Reports*, beginning on page 829. Other excerpts from the report have appeared in the October and November 1953 issues.

Availability of Personnel

An examination of the personnel situation at the time of the survey revealed that, in general, trained personnel were inadequate in number to staff existing health facilities. This was most in evidence in the field of hospital nursing.

Many large hospitals were operating without a single graduate nurse, and many more had very few. In Chile, where nursing was more advanced than in many Latin American countries, a tuberculosis hospital with a bed capacity of 460 had 16 graduate nurses and 74 auxiliaries; the nursing staff of a 380-bed general hospital consisted of 15 graduate nurses and 300 auxiliaries. In Ecuador, where nursing as a profession is of very recent origin, one 950-bed hospital was employing 3 graduate nurses and 24 trained auxiliaries, most of the nursing service being given by untrained aides.

Sanitary engineers, sanitary inspectors, and even physicians were also clearly insufficient in number if entire populations were to benefit from health services. In many of the countries visited, however, little effort to provide health services outside the large urban centers was in evidence. According to the latest figures available at the time of the survey, the entire medical profession of Bolivia was serving only one-third of the population. In Brazil, 75 percent of the physicians of the country were serving the 24 percent of the population living in towns of more than 10,000; only 25 percent of the physicians were available to meet the needs of the remaining 76 percent of the population, essentially rural. A similar situation was found in Ecuador, where 50 percent of the physicians were serving the 15 percent of the population living in the cities of Quito and Guayaquil.

The reason for the concentration of the medical profession in cities was basically economic. Only in the large urban areas could a physician earn enough to justify the time and money required to become a physician, and only there were to be found the medical facilities, such as hospitals and laboratories, which would enable him to practice the type of medicine for which he had been trained.

Training Facilities Needed

With the great need for trained personnel in urban institutions, especially for nurses, nurse's aides, and hospital administrators, and an even greater need in the rural areas for physicians, the facilities for the preparation of all types of health workers are apparently extremely inadequate. Many of the institu-

tions claimed that there was not enough money available to permit the employment of a larger number of well-trained personnel and that the imbalance seen everywhere between the need for and the supply of well-prepared workers could not be corrected simply by establishing more educational institutions. Notwithstanding this reasoning, more facilities for training are indicated.

The basis for this judgment can be illustrated by the hospital situation. During the field survey, substantial evidence was found that the average hospital stay, and therefore the average cost per patient, could be substantially lowered by improvements in administrative, medical, nursing, and therapeutic techniques. Under good management provided by a well-trained hospital administrator, the patient stay at the university teaching hospital in Santiago, Chile, was lowered from 26 days in 1946 to 16 days in 1951. In a number of hospitals the average stay of patients with typhoid fever, typhus fever, and venereal diseases had been substantially reduced by the use of certain of the newer antibiotics.

The consequent reduction in costs in the instances cited may be said to bear a direct relationship to the quality of the personnel administering the health services. Savings brought about by improved quality of personnel would be available to increase the number of workers of all categories. The major question, therefore, may not be whether a hospital can afford well-qualified personnel, but whether it can afford to continue operations without such personnel.

Quantity vs. Quality

The problem of staffing a health institution, whether it be a hospital, health center, or other type of organization, involves quantitative as well as qualitative considerations. Again using the hospital for purposes of evaluation, though recognizing that the principles have broad applicability, it may be asserted that in no country will there ever be a sufficient number of professional nurses to perform all the traditional functions of nursing. Even in the United States, where trained nurses are far more numerous than in Latin America, this fact

is now recognized and generally accepted. It has become necessary to study and analyze nursing functions in order to decide which must be performed by the highly trained nurse and which may be safely performed by a person with less training.

The general concept today is that the nursing service of a hospital or a health program may be broken down into groups of functions. Each of these groups may be performed effectively by persons with widely different backgrounds and training. The quality of service will be improved when training is based on the requirements of the functions within each group and the groups are integrated to provide complete patient-centered care. The professionally trained nurses in such a system must be responsible for the training of personnel as well as the coordination and supervision of their work.

Considerable experimentation in the use of subprofessional personnel was being carried on in several countries of Latin America. In the Amazon Valley wide use was being made of auxiliary nurses in the hospitals and *visitadoras* in health centers. In Uruguay most of the public health nursing service of the health centers was being provided by specially trained *visitadoras* working under the supervision of graduate nurses. Many more examples might be cited, but none of them indicate that the quantitative aspects of the nursing problem have been adequately met. Furthermore, in many instances the quality of the subprofessionals' work has left much to be desired.

Further experimentation directed toward a solution of the quantitative as well as the qualitative aspects of personnel employment in Latin America is highly desirable. Nowhere is such experimentation more urgently needed, nor does it have a more favorable environment in which to thrive, than in Latin America.

Inservice Training for Professionals

Apprenticeship training was employed rather extensively in the early years of many of the *Servicios* and continues to be of considerable utility. For example, a United States sanitary engineer on the field party staff and a Latin American engineer untrained in sanitary engi-

neering may work together as a team, the former serving as the tutor and the latter as the apprentice. Over the years a rather large group of competent Latin American sanitary engineers has been created by this method of training. It has also been employed to train physicians and graduate nurses for public health work. Sometimes apprenticeship training was supplemented by academic training through the fellowship program of the Institute. Such training offers an excellent opportunity for identifying individuals who should receive specialized academic training.

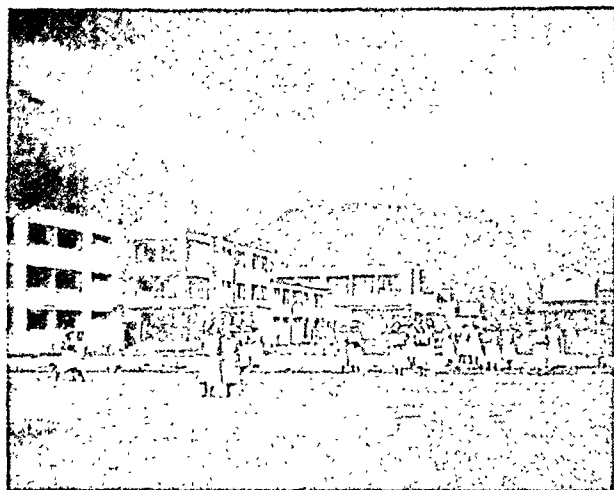
Another type of inservice training provided in a few areas of Latin America was the planned conference. For example, the nurses on the staff of the Cerro Barón Health Center in Valparaíso, Chile, were required to attend a weekly conference at which each shared her experiences with the others in regard to special problems encountered and methods used for solving them, successful or not. The advantage of this type of inservice training is that the individual experience becomes the group experience and each person profits.

The planned conference may, of course, include more than one category of worker. All the health center personnel—physicians, dentists, engineers, nurses—may be assembled at regular intervals for the purpose of sharing experiences, analyzing problems, discussing possible solutions, and planning new undertakings. Such conferences tend to weld the group together so that it thinks of itself and conducts itself as a team. A sort of mass-action phenomenon results, producing an effect which is something more than the sum of the individual activities.

Inservice training of professionals should be a constant preoccupation of the administrators of every *Servicio* since it provides the means for continuous improvement in the quality of performance.

Specialized Academic Training

In the early period of *Servicio* operations, it was necessary to send nationals abroad for specialized training. To this end, a fellowship program was established by the Institute, and hundreds of physicians, engineers, and nurses



Top: The National Superior School of Nursing at Bogotá, Colombia, was built and equipped by the Servicio. Center: Student nurses receive instruction from a Servicio staff member in La Paz, Bolivia. Lower: As part of their inservice training linked with field service, the nurses meet with their supervisor to discuss plans.

were sent to the United States. Although this program eased the situation, it did not solve the problem in any country. No fellowship program could ever hope to meet the entire need for specialized personnel; each country must solve the problem in its own way.

At the time of the survey, a number of the Latin American countries had taken steps to provide academic training in various branches of public health. The Faculty of Hygiene and Public Health of the University of São Paulo in Brazil, the School of Public Health of the University of Chile, the School of Public Health and Hygiene of the Secretary of Public Health and Assistance in Mexico, and the School of Tropical Medicine of the University of Puerto Rico were offering courses in such subjects as public health nursing, hospital administration, maternal and infant hygiene, industrial hygiene, health education, sanitation, statistics, and public health laboratory techniques. The Graduate School of the Autonomous National University of Mexico was offering courses in sanitary engineering.

There are distinct advantages to training Latin Americans in their homeland instead of in the United States. It is less expensive since both travel expenses and the cost of living are less. The period of adjustment is shorter because of the language, social, and cultural similarity between the various countries. It is recommended that wider use be made of the Latin American institutions for fellowship training, reserving the United States institutions for special cases.

The men and women who have benefited or who will benefit as a result of specialized academic and inservice training are, for the most part, the product of the various national Latin American schools of medicine, dentistry, engineering, and nursing. Public health as well as medical services, therefore, is conditioned in a very real sense by the quality of medical, dental, engineering, and nursing education.

Logically, any effort to advance a broad health program—one that neglects neither preventive nor curative medicine and one that is concerned with environmental as well as personal health—must take into account all these educational institutions.

Schools of Nursing

Establishing schools of nursing or strengthening those already in existence received considerable attention during the decade under survey. Projects were sometimes undertaken as a joint effort of the *Servicios*, the Pan American Sanitary Bureau, and the Rockefeller Foundation, in collaboration with the appropriate national ministry.

In developing a school of nursing, several factors must be considered: recruitment of students, housing, classroom and teaching facilities, and financial support for the school. Perhaps most important is a faculty capable of planning programs which meet specific needs, developing curriculums for effective learning and practice areas for supervised experience in patient care, and reevaluating the programs to determine how well the objectives have been accomplished.

The National School of Nursing of the Central University of Quito in Ecuador is an example of a project which has shown excellent results in progressive national participation and which demonstrates the possibility of inter-agency cooperation.

Before 1942, there was a school of nursing at the Hospital Eugenio Espejo in Quito which conducted a 3-year course. The school was directed by a physician, and all instruction was given by physicians. The curriculum was limited, and there was no opportunity for supervised clinical experience. There were no residence quarters for the students.

In 1943, at the request of the Minister of Health, two nurses were assigned to Ecuador by the Pan American Sanitary Bureau to assist in reorganizing this school of nursing or if necessary to establish a new modern school of nursing. The decision was to establish a new one. The *Servicio* agreed to reconstruct and adapt a building provided by the Ecuadorian Government to house the new school. The Rockefeller Foundation furnished some of the equipment, assisted in the initial cost of operation, and provided consultation service.

From 1942 to 1949 one of the United States nurses assigned to Ecuador was director of the school of nursing. During 1947 and 1948, an Ecuadorian nurse, a graduate of the first

class, was sent to the United States for a year's graduate study. In 1949 she became assistant director of the school and in 1950 became the director. The Institute nurse continued to give consultation but gradually turned over more and more of the responsibility to the new director. By early 1952 the Government was completely supporting the school of nursing as a part of the university, and the *Servicio* was providing some scholarships to students. An advisory committee composed of representatives of the university and the Ministry of Health was working with the school faculty in setting up and maintaining standards. There has been a continuous attempt to keep the requirements for admission, the provisions for clinical experience, and the curriculum content in line with the needs of the country. At the end of 1951, 98 nurses had graduated from the school and 60 students were enrolled.

At the time of the survey the Institute was cooperating in the building programs of 8 schools of nursing: 1 each in Guatemala, El Salvador, Colombia, and Ecuador, and 4 in Brazil. Assistance was being given to the operation of 12 schools: 1 each in Colombia, Haiti, Ecuador, Uruguay, Paraguay, and Venezuela, and 6 in Brazil. Some technical consultation on nursing education has been provided in all countries, even when no nurse has been specifically assigned for that purpose.

It is doubtful whether the schools of nursing in Latin America should be patterned after those in the United States. Rather, it seems wise to prepare nurses especially (a) for work in those particular fields which constitute the major health problems in their countries and (b) for the training and supervision of auxiliary personnel in hospitals and health centers.

In view of the needs of the countries, it is strongly recommended that continued support be given to schools of nursing. This support may take the form of (a) construction of buildings to house schools and, when considered necessary, to provide housing for the students; (b) improvement of practice areas, which may include use of funds for reconstruction of buildings or purchase of equipment to provide basic essentials for patient care and assistance in improving the efficiency of operation of existing institutions; and (c) assistance, on a consulta-

tion basis, in the administration of the school, curriculum planning, and preparation of instructional personnel.

Medical Education

Analysis of medical education in Latin America was based upon what were regarded as certain essentials of a good school of medicine. Though far from complete, the following guides were found useful:

1. Limitation in the number of students, with appropriate methods for their selection. In most of the countries visited there was no limitation of matriculants. Chile, where the number was restricted to correspond with the teaching facilities, was an outstanding exception.

2. Selection of faculty members on the basis of teaching ability and scientific productiveness. They should enjoy reasonable security in respect to income and tenure. The faculty of the departments responsible for the basic sciences should be able to devote their attention exclusively to their departments without the need to seek additional employment. Relatively few of the schools of medicine observed in Latin America are so staffed.

3. Sufficient school-plant space in lecture rooms and especially in laboratories to accommodate the maximum number of students permitted to matriculate. The scientific equipment and supplies of laboratories should be adequate to permit good instruction in the basic subjects. Hospital wards of all types should be freely available for teaching clinical subjects. Workable relationships should be established with the local health services so that the social and preventive aspects of medicine may be taught. The hospital facilities for teaching clinical medicine were found to approximate adequacy more frequently than any of the other facilities.

4. A good library. Few of the schools observed were adequately equipped.

5. A budget large enough to sustain good operation and administration. Budgets of Latin American schools were reasonably adequate in only a few schools.

In a number of countries, it was apparent that much thought and effort were going into measures for the betterment of medical education. The country was rare in which no attention was being directed to the subject.

Service and Training

Schools of medicine everywhere have a crucial decision to make. Shall they devote their efforts to meeting the countries' needs quantitatively, or shall the quality of their product have priority?

As already mentioned, in many Latin American countries medical services are available to only a part of the population. For this reason there has developed a school of thought advocating the production of more and more physicians even at a sacrifice of quality and insisting that a poorly trained physician is better than no physician at all. This extreme position, as well as the opposite one, appears to be untenable if the best interests of the people are to be served. The solution of the problem in Latin America probably is to be found somewhere between these extremes.

The survey indicated that an important reason for the divergence of views respecting the aims of medical education stemmed from the fact that institutions responsible for education rarely were responsible for providing medical services for the people. A variety of agencies, official and voluntary, were operating in the hospitals, the health centers, and other institutions providing medical services. In most of Latin America, the ministry of health had the chief responsibility; yet, it was rare for this ministry to have more than a very minor voice in shaping policy regarding the number and quality of physicians to be trained to man those services. The ministry of health, the ministry of education, and the schools of medicine should study and plan jointly in order that the product of medical education may be prepared to carry on the type of services needed.

Servicio Responsibility

The fact that medical education has a direct relationship to medical care raises a question as to the *Servicio's* responsibility in this field. It is strongly felt that medical education should receive more attention by the *Servicios* than in the past. The fact that no sure course of action can be forecast should only add zest to the acceptance of an unusual challenge. Study of the many functions of physicians in public service, whether in hospitals, health centers, or

other public health activities, and classification of these functions into those which physicians alone can perform and those which might safely be assigned to other categories of personnel are steps that can and should be made in the near future.

In many areas a division of responsibility has already taken place. Immunization against smallpox and other diseases and the diagnosis and treatment of such diseases as malaria, hookworm disease, and yaws were being performed by nurses and sanitary inspectors. By such procedures it has been possible to bring to remote, rural populations the benefits of modern medicine and public health. It may well be that following painstaking study or job analysis of the physicians' work, organizations could be established, with appropriate safeguards, to extend services still further to such peoples. Success in such work, of course, depends in large measure upon the availability and the quality of supervision by physicians.

Training of Subprofessional Personnel

Training of subprofessional personnel may follow the same general plan as outlined for professional personnel—an apprenticeship type of inservice training and/or academic training. The need for both should be recognized, and both should be planned to assure competence on the part of each type of worker to perform effectively the tasks required. Ultimate responsibility for the training must rest with the professional personnel.

In a number of countries, there was found a body of experience in training subprofessional workers which would prove valuable in the event that the use of this type of worker should be extended. In Brazil, for example, a 6-month course for *visitadoras* was inaugurated at the Colatina Training Center. This course included demonstrations and supervised practice as well as carefully selected basic information. In Bolivia, where efforts to assist with the development of a professional school of nursing had not been successful, primary emphasis was shifted to on-the-job training of *visitadoras*. In Paraguay, *visitadoras* were being trained in an 18-month course sponsored by the *Servicio*-operated health centers.

The survey, however, uncovered a lack of permanent inservice training for subprofessional personnel. There appeared to have been relatively little attention to recruitment of persons for training as subprofessionals, nor was there evidence that the subject had been seriously studied in the health field generally.

There was observed a disposition to question the value of the subprofessionals on the ground that their educational backgrounds and understanding were such as to limit unduly their effectiveness as workers. It is suggested, however, that the ineffectiveness of subprofessional workers may result in no small part from the type of person that has been trained. Often the recruiting procedure has taken no account of the fact that certain types of jobs call for certain qualities. The subprofessional workers who are to be prepared to assist in handling the sick must have not only reasonably high intelligence and a degree of dexterity, but kindness, devotion, and a sense of responsibility. The sanitary inspector, who must work with people in advancing his program of environmental sanitation must be intelligent, persuasive, dexterous, inventive, and friendly.

The problem is how to identify in recruits these innate qualities. There are obvious difficulties to scientific recruitment, but this does not mean there are no advantages. The health administrator must look to the psychologist, the cultural anthropologist, and kindred professionals to furnish the techniques whereby the human qualities that are sought can be identified and possibly measured. Once a selection has been made among potential recruits, the process of training offers no inherent difficulty.

Fellowship Program

In addition to the training and education activities sponsored through the *Servicios*, the Institute of Inter-American Affairs directly finances and administers a fellowship program. From the initiation of the program in June 1943 through the end of 1951, 1,302 grantees had been sent to the United States for specialized training, including 753 doctors of medicine, 262 engineers, 120 nurses, 37 dentists, 15

health educators, 31 laboratory technicians, and 84 others, such as hospital administrators, veterinarians, architects, and chemists.

The significance of this program can be judged in part by the records of the recipients after their return to their own countries. Of 73 Chilean fellows, 69 (94 percent) were employed at the end of 1951 in positions for which they were trained or in similar ones; of 25 fellows in El Salvador, 20 (80 percent) were so employed; and of 28 fellows in Ecuador, 24 (85 percent) were in official positions. It was common to find that fellowship recipients had risen to positions of importance in their national health services and various ministries.

The fellowship program was well conceived and well administered, and it has resulted in strengthening the indigenous health organizations, as well as paving the way for the incorporation of certain *Servicio* projects into the permanent public health structure. The following suggestions, however, may deserve consideration:

1. In order to insure the greatest degree of success, it is essential that candidates be carefully selected as to ability to carry out a program at a foreign university; that there be, insofar as possible, a specific understanding regarding the position for which they are being prepared; that the course be carefully planned with the university so that the students have

an opportunity to take work which will meet their specific needs (whether it meets the requirements of the school for a degree or not); and that the instructional personnel in the host university be informed regarding the national needs for which the candidate is being prepared.

2. Training might prove to be of greater value if a plan were worked out whereby several trainees in the same academic field would be brought to the same school in the United States for study, and a North American specialist in that field, with some knowledge of Latin America, assigned to spend full time as adviser and tutor to the group. A variation of this approach might be to arrange for faculty members from schools in the United States to make visits to Latin America in order to gain better insight into the needs of the students.

3. Carefully planned and supervised experience might prove more valuable in some instances than organized academic courses.

4. It must be recognized that the success of any training program, particularly on an advanced level, is largely dependent upon the care with which plans are made for individual students. For best results in the fellowship program, there should be sufficient staff available at the Institute in Washington to develop plans for individual students, and to assist them with problems related to personal adjustments as well as those related to the training.

Public Health Reports Index for 1953

The index to *Public Health Reports* for 1953 (vol. 68) will be published as a separate and distributed to all subscribers early in 1954. In addition to author and subject entries for all material which appeared in the monthly issues for January–December 1953, the index will contain data for Public Health Monographs published during 1953.



Development of Environmental Health Programs

Recognizing that improvement in environmental conditions would aid materially in solving some of the major health problems of Latin America, the *Servicios* devoted considerable effort to the development of sanitation and other environmental health programs. Their undertakings are evaluated in terms of technical competence, benefits derived, and the degree to which they have strengthened national health services.

ONE OF THE PRIMARY objectives of the bilateral health programs during World War II was to provide an environment in which workers in the Latin American Republics could produce desired strategic materials. The most important environmental health problems during that period were those of malaria and gastrointestinal disease control, and improvement in sanitation was recognized as a major factor in attacking these problems. The early sanitation programs were concerned primarily with construction of small water supply systems and sanitary privies, though in some countries rather large sewerage systems were constructed. At the time of the Public Health Service survey, early in 1952, most of the permanent works installed during the emergency period were being maintained by the Latin American governments.

This is the tenth in a series of excerpts from the Public Health Service's evaluation of the bilateral health programs of the Institute of Inter-American Affairs undertaken during the decade 1942-52. For additional information, see page 1243 of this issue.

Following the war, emphasis was shifted gradually from meeting the needs dictated by war to providing technical assistance and financial support for continuous improvement of health. A safe water supply and adequate sewage disposal were recognized as basic essentials of a public health and sanitation program, and primary emphasis in sanitation was placed on these two factors.

Water Supply

The *Servicios* have built water supply systems in every country except Colombia. During the decade under survey, major efforts were directed toward the small cities and towns. Planning, designing, and construction were usually all done by the *Servicio*. Construction by private contractors was tried but generally found unsatisfactory because the contractors were not accustomed to doing such work and were not always available in the isolated locations where much of the work was done. Force accounts methods usually proved to be cheaper than contracting. However, in Mexico all work was being done by contract, and Brazil was gradually developing contractors competent to do the work.

Three advantages especially were apparent in the *Servicio* method of operation in building water supply systems. It provided opportunity for the development of experts who could devote full time to this activity, made possible a minimum of redtape in financing projects, and resulted in a minimum of friction among planners, designers, and builders. Low construction costs, by United States standards, were made possible by the use of low-cost labor and local materials whenever possible. Construction was generally done efficiently and well. For these reasons, the *Servicios* were generally stronger and had a greater appeal for the limited national funds in the field of sanitation than the indigenous health services.

There were disadvantages, however, to this type of operation. It might tend to stifle local initiative in the technical and administrative fields, and there was a decided tendency to bypass existing local agencies that had some responsibility for the construction or operation of water supply systems. In one country, the division of sanitary engineering in the national health service was abolished and its activities turned over to the *Servicio*. In another, responsibility for building public water systems was transferred from the national agency to the *Servicio*. Exceptions to this tendency were found, however, notably in Chile and Costa Rica. In Chile, the *Servicio* was assisting the national health service in the technical and financial phases of its sanitation program instead of developing competing programs.

The value of national organizations doing things for themselves is basic. In the long run, the development of administrative and operational units is as important as the development of technical competence or the fulfillment of the immediate desires of a community. *Servicios* might well direct their efforts toward the establishment of divisions of sanitation in the Latin American countries where they do not exist, and in all countries they should carry on the majority of their activities in the sanitation and engineering fields through such divisions. Working through indigenous health agencies will facilitate the conversion from bilateral to unilateral programs.

Water supply systems were generally very simple constructions. Ground water was usually the source of supply, and the supply was usually brought to the place of use by gravity. Gravity-pressured ground water systems are advantageous because they are relatively inexpensive to operate and simple to maintain. Distribution systems were generally modest compared with those in the United States. Since there is not the need for fire protection that there is in the United States and since most systems are unmetered, small-capacity distribution systems are favored because they reduce water wastage occasioned by faucets being left open.

Considerable credit is due the *Servicios* for their efficiency in constructing water supply systems. Much improvisation was observed, which went far in overcoming the handicaps of undertaking major construction in remote areas which were not served by ground transportation and where few, if any, skilled artisans were to be found. Many projects were built with a minimum of construction equipment. In one Honduras town, where all materials had to be moved by air, the only equipment provided was hand tools.

Construction costs averaged about \$16 per capita, with a range of from \$5 to \$43. These costs, though not exceedingly high, represented a considerable investment for Latin American countries, whose per capita annual income, based on United Nations estimates, was about \$155 in 1949.

Shortcomings of water supply construction programs could generally be attributed to insufficient consideration of the economic status and cultural background of the community to be served. Some examples were observed of expensive, ornate architectural treatment of buildings and the incorporation into projects of unnecessary gadgets, such as totalizing meters and various gauges.

In an effort to provide the utmost safeguards to the public health, chlorinators were placed on a great number of ground water supply systems, despite the fact that the quality of the water was generally satisfactory. This precaution was apparently not fully appreciated by

the recipient people, and perhaps half of the chlorinators were not in operation at the time of the evaluation survey. The lack of operating funds and the complexity of the chlorination devices, coupled with the fatalistic attitude of many of the people concerning disease, were identified as factors influencing the removal, the destruction, or the nonuse of chlorinating equipment.

Third-Party Contributions

Contributions by the people directly benefited by water systems are considered essential to their full appreciation of, and responsibility for, a community water system. The *Servicios* recognized this principle and in recent years nearly all systems built by them received local, or third-party, contributions. In the 177 completed projects, third-party contributions amounted to 38 percent of total costs. The amounts varied from small individual contributions of labor to contributions covering the total cost of the system.

Frequently, however, contributions promised by third parties did not materialize, and the *Servicio* was forced to use more funds than was originally allotted to complete a project. In one country failure of third-party contributions has been reduced by the requirement that such contributions be in the hands of the *Servicio* before any construction begins.

In a few instances, contributions of labor were successful, but the organizational problem of using gratuitous labor generally precluded its effective employment. Satisfactory use of gratuitous labor appeared to be limited to towns of not over 3,000 population where there was a strong local leader who could command support of the people and supply initiative. There also must be a well-recognized and pressing need for the water supply and no other way to obtain it.

Public Attitudes

Water supply projects were received enthusiastically by the people of the communities. However, it appeared that usually reception was based on the desire for water rather than upon the public health significance of a safe water supply. In one community local inhabitants felt that pure water was good for the

children but was unnecessary for the older people because they had developed an immunity to waterborne diseases. In another community the local druggist reported that the installation of a safe water supply had materially reduced the incidence of gastrointestinal diseases. His report was based on a reduction in sales of medicines widely used to control these diseases.

To really appreciate the effect of the installation of a water supply system on the citizens of a community, one should witness the inauguration celebration held at the completion of a project. It is a holiday, a festival that may last for as long as 2 weeks. It is solemn, with its religious dedication, and stirring, with its speeches by political and civic leaders. It is spectacular, with its parade and marching bands, its sports events, its bullfights, and its dances. For the time at least the people feel that the project is the most important thing in their lives.

Operation and Maintenance

Unlike some projects undertaken by the *Servicio*, the water supply projects were generally turned over immediately by the national government to the municipality for operation. In general, the operation and maintenance of *Servicio*-built water systems was inadequate because of the lack of competent operators and sufficient funds. A definite trend within the *Servicio* toward the training of water supply operators was noted, however.

In some countries, the *Servicios* were establishing local boards to act as policy-making and administrative groups and to be responsible for collecting the necessary funds for maintenance and operation. This procedure has worked well in Mexico, where all water users pay for water service. In Honduras, the *Servicio* not only set up the administrative board but trained the persons who would become the operators when the project should be turned over to the local authorities.

There is much to be done in securing better operation and maintenance of many of the *Servicio* projects. Unless maintenance is improved, the capital investment in some will ultimately be lost. In a number of instances, the systems which the *Servicio* built replaced systems which had been put into operation 30 to

50 years previously and had been allowed to deteriorate until there was very little left. It is apparent that responsibility for operation and maintenance cannot be left solely to local interests and that some national government agency (preferably a division of sanitary engineering) should assist the local people. The national agency could not only check on the safety of the supply, but also assist the local boards, administrators, and operators in all phases of operation, including financing and business administration.

Surveys

In Panama, where the *Servicio* program was being reinstated in 1951, a sanitary survey of all communities was being made as a logical primary step in undertaking a water supply program. Such information was not available in most Latin American countries, and water supply systems were being built with little regard for the priority of need between the various cities and without too much concern about the demonstration value of any particular project. The availability of third-party contributions was regarded as perhaps the greatest determining factor in deciding where supplies would be developed. Inasmuch as the *Servicios* cannot build all the systems desired, it would seem better to concentrate efforts on good demonstration projects and in areas where the health problems are most pressing.

Individual Supply Units

A relatively small amount of work has been done in the development of individual water supply units. This phase of sanitation has not received the emphasis it deserves. Individual units are inexpensive and can be built by subprofessional personnel. It seems advisable to have at least one demonstration project of this type in each country.

Sewage Disposal

The latest figures available at the time of the survey showed that a total of 101 community sewage projects had been undertaken at a cost of \$5,885,797. Third-party contributions amounted to 6 percent of the total cost. Only a few of these projects included sewage treatment.

The general impression gained during the survey was that communities wanted sewerage systems primarily because some neighboring community or the capital city had them. However, most Latin American communities were greatly in need of improved and expanded excreta disposal systems, and the cost of sewers was quite modest. The few figures available showed that construction costs amounted to about \$5 per capita.

It was a universal practice to use concrete sewer tile manufactured at the project site. No evidence of failure of these concrete pipes was found, even though they are subject to rapid deterioration if septic sewage is handled. The success in using these materials was attributed to skillful designing by the *Servicio* engineers.

Sanitary Privies

The construction of sanitary privies has been an important sanitation project of the bilateral health programs since their inception. This activity was carried on in every country. Fifty-seven projects costing \$415,000 have been undertaken, 15 percent of the funds supplied by third parties. In Brazil, about 20,000 privies were built; in Chile and Colombia, 3,000 each; in Venezuela, 9,000; and in Nicaragua, 2,500.

Construction of sanitary privies is fundamental to a sanitation program and ties in closely with the building of individual safe water supply units. It is a program which can be carried on by subprofessional workers, and it is effective in controlling intestinal parasites.

Privy building costs were found to be relatively high. The cost of a concrete slab and riser was about \$6, and that of a completed privy from \$11 to \$16, an excessive amount in some regions. In many small villages the cost of a privy would be close to 50 percent of the value of the home it services. Efforts to reduce costs by mass production and the development of new materials, such as precast, wood-reinforced concrete superstructures, were observed in Chile.

Stream Pollution Control

The disposal of community sewage into the nearest water course creates new health hazards for downstream water users. The danger of

this practice, which was found common to most *Servicio* sewerage projects, was quite evident because of the widespread use of the streams for bathing, laundry, and drinking purposes.

The economic condition in most of the countries, however, would seem to preclude the early installation of sewage-treatment plants. There are several possible solutions to the problem:

1. Instead of sewerage systems, individual septic tanks could be built which would discharge into the ground. They could be financed by the persons needing them. The rest of the community could be supplied with pit privies. This solution would be satisfactory in small- and medium-sized communities, as well as in suburban areas around the larger cities.

2. The lagooning of sewage for a 30-day period before discharging it to streams would be inexpensive and, where the lagoons are properly designed has been found to be successful, as in the western part of the United States.

3. The use of streams for other purposes than waste disposal could be prohibited, and public laundries, bathhouses, and water supply systems constructed so that the people would not have to use streams for these purposes.

Little evidence was found that industrial wastes were a problem of major significance. Generally, industrial wastes are discharged through separate outlets, with the dilution water available usually caring for these wastes satisfactorily. In El Salvador the industrial-waste problem connected with the coffee industry was investigated by United States engineers. However, no definite conclusions were reached or remedial measures taken. In Chile the *Servicio* has built three modern sewage-treatment plants and has joined with the Ministry of Public Works in supervising the operation of these and other plants which are the responsibility of the Ministry. These plants are well operated, and the personnel assigned to the operation project have been quite successful in obtaining additional sewer connections to the system.

In contrast to this situation, a sewage-disposal plant built by the *Servicio* at Santa Tecla, El Salvador, was being allowed to function improperly and to deteriorate to a point where it needed replacement. The condition of the plant clearly indicates that a followup must be

made by some competent person from a responsible agency after the construction of a sewage-treatment plant.

Vector Control

Malaria has long been a leading cause of death and economic loss in many parts of Latin America and has received a great deal of attention by indigenous health services. It was natural, therefore, that the *Servicio* should join the countries in their antimalaria campaigns in order to carry out more widespread and intensive programs. In the beginning, antimalarial measures were of the so-called permanent type, such as ditching, draining, filling, diking, and larvaciding with oil and toxic agents.

Vector control was greatly benefited by the development of new insecticides that have a residual killing power. The use of these insecticides has in many instances reduced the need for permanent control projects and permits carrying out antimalaria programs with less highly skilled technicians. Spraying, however, should not replace other means of control.

In Mexico, the *Servicio* was providing spray equipment free and furnishing DDT at cost. In Colombia, the *Servicio's* spraying program had stimulated the establishment of several commercial spraying firms that were providing services on contract. The *Servicio* was aiding such communities by checking the toxicity and coverage of sprays used by independent contractors. In El Salvador, Brazil, and Venezuela, vector control activities begun by the *Servicio* had been turned over to the national health services and were being successfully carried on by them.

Vector control by the *Servicio* in Ecuador was found to have been eminently successful. In the highlands near Quito, anopheles mosquitoes had migrated up the deep narrow valleys from the sea, bringing malaria with them. In the affected communities, the enlarged spleen rate in children ran as high as 80 percent. Populations were dwindling and some of the country's most valuable agricultural land was not being used. By drainage and other antilarval measures, mosquito-breeding areas in the highland communities were destroyed; 1,400 square kilometers of land were freed from anopheles

mosquitoes. Malaria disappeared and land values soared as agriculture was again extensively pursued. An incidental byproduct of the drainage work done for mosquito control was the improvement of the land for agriculture. The drainage made irrigation possible.

Industrial Hygiene

A division of industrial hygiene in the national government may be found in all of the Latin American countries which are partially industrialized. They have functioned primarily, however, in the field of labor-law enforcement and have not developed technical, fact-finding services with which to aid industry in the study of its health problems. There has been a conspicuous absence of preventive programs, and trained industrial hygiene personnel are lacking.

Agricultural workers, the largest group of workers in Latin America, should not be excluded from industrial hygiene programs. It is now realized that serious problems occur with the use of large quantities of insecticides toxic to human beings, the properties of which are little known. Much of the agriculture in Latin America may be considered "industry-in-the-field," since sugar, cotton, and coffee plantations employ thousands of workers under single management, making it possible to attack health problems of the workers effectively.

Efforts to develop modern industrial hygiene programs have been successful in Bolivia, Brazil, Chile, Colombia, and Peru. In Peru and Bolivia, laboratories and libraries have been established, personnel trained at home and abroad, and surveys made to define the problems. Corrections of many health hazards have already been made.

In Peru, the Department of Industrial Hygiene had a staff of nearly 50 workers, of whom more than 20 were professionals. During the 2½ years just preceding the evaluation survey, approximately 70 industries were studied and 7,200 physical examinations made. The medical examinations were being analyzed by machine methods. These analyses were to establish the incidence of silicosis and other occupational diseases as the basis for steps in their control.

The establishment of industrial hygiene programs has been accomplished with the concurrence of the appropriate ministries. The program was usually headed by a North American engineer who had had broad experience in the field. Sometimes he acted as a consultant to a national chief of industrial hygiene activities. National physicians, engineers, chemists, and other technicians were employed, the ratio of national professional staff to the United States professionals being about 14 to 1.

Although it has been found preferable to place the industrial hygiene program organizationally so that its activities may be closely coordinated with other phases of environmental health, only in Chile was the program placed in the Ministry of Health. In Peru and Colombia, however, the programs were placed under the administrative jurisdiction of the *Servicio*. In Peru, Brazil, and Bolivia, they were in the Ministry of Labor.

Miscellaneous Projects

A number of other projects for the improvement of environmental conditions were undertaken in several countries. Public laundries and public bathhouses were built rather frequently by the *Servicios*. These facilities were enthusiastically accepted. The people could easily comprehend their value, not so much from the public health standpoint, but as a convenience and a way to better living.

In El Salvador, the *Servicio* was engaged in a rather extensive slaughterhouse-building program. In the capital city, this project was fairly successful, but in the small towns, maintenance and sanitation of the abbatoirs left much to be desired.

In a few instances, *Servicios* have assisted communities with their garbage disposal problems. Costa Rica was studying the possibility of composting garbage, and the *Servicio* in Brazil was preparing standard plans for small incinerators.

In some instances, the *Servicio* has been instrumental in training subprofessional public health workers in the field of sanitation. It was explained that more of this work would be done were there a demand for it, but it was considered unlikely that the demand would

develop until the realization of what this type of worker has to offer to health programs should become more widespread.

Summary and Conclusions

The need for environmental health programs, particularly sanitation programs, in Latin America is great and widespread. Improved environmental conditions will help lower the high infant mortality rate, make labor more productive, and prevent the enormous economic loss due to illness.

In general, the environmental health projects have been successful and have been accepted with enthusiasm by the recipient peoples. From an administrative, technical, and financial standpoint, the work of the *Servicios* compares favorably with that of the indigenous agencies.

Generally, however, *Servicio* sanitation programs have not strengthened existing health agencies. The use of *Servicio* personnel as consultants and the development of projects on a demonstration basis have not been widely practiced. Notable exceptions were found in Chile and Costa Rica, and the programs in these countries appear to be eminently successful.

In view of the different cultural, political, and economic patterns of Latin American countries, the importance of timing, and the varying objectives of the programs, it is impossible to establish definite criteria for evaluating the existing programs or to make detailed recommendations for their improvement. The following, however, may serve as guiding principles:

1. The *Servicio* should encourage the development of environmental health activities on as broad a base as possible, within the framework of the indigenous health services.

2. It should give major emphasis to planning, advisory, and directional services and devote less effort to detailed design, construction, and operational services.

3. It should make greater use of its prestige, influence, and knowledge to bring harmony between the various national agencies having an interest in environmental health problems.

4. Recognizing that American public health practices cannot be transposed without modification, the *Servicio* should encourage research in the methods and standards that will best fit Latin American cultural and economic patterns.

Public Health Developments in Liberia

This excerpt is from an address by Nelson A. Rockefeller, Undersecretary of Health, Education, and Welfare, before the biennial convention of the National Council of Negro Women in Washington, November 12, 1953:

"The first bilateral international health program in which the United States participated outside our own Hemisphere was in Liberia. Although Liberia has had close ties with the United States, it has not kept pace with the development of our own country. In 1944, however, the Public Health Service dispatched a mission to Liberia—at the request of President Tubman of Liberia—to help the Liberian government work toward a solution of its major health problems.

"Here was the situation that confronted the Public Health Service mission to Liberia in 1944: Preventable diseases were seriously hampering the economic and social growth of the country. There were only 6 physicians, 2 dentists, and 4 graduate nurses to serve a population of 1.5 million. There were only 230 hospital beds in the entire country, and no pharmacists or drug stores.

"The major accomplishment of the U. S. Public Health Service Mission has been the assist-

ance given the Liberian Government in developing the Liberian Public Health Service. In 1946, the Liberian Government's appropriation for public health activities was \$82,630. In 1953, the total expenditures of the Liberian Public Health Service exceeded one million dollars.

"With our help, Liberia has controlled malaria around the capital, Monrovia. A nursing school has been established. Smallpox is no longer a public health problem in Liberia. For the first time in the history of Liberia, a Liberian physician heads its own Public Health Service.

"He is Dr. Joseph Togba, born of tribal parents and educated at the Meharry Medical School. The U. S. Public Health Service brought Dr. Togba back to the United States to study at Harvard and Columbia Universities, in order to prepare him for his present post. He has succeeded magnificently. In 1953, he was one of three candidates for the Presidency of the World Health Organization of the United Nations.

"The international health and education programs of our Government now circle the globe. They have all been built on the lessons learned first in Latin America and the experience gained in Liberia."



Health Education in Principle and Practice

To work with—not to do things merely to and for people—became an accepted basic principle of the bilateral health programs in Latin America after the emergency period of World War II. This principle, the evaluators find, deserves much more emphasis in future, as well as current, programs, however, before the joint efforts of Latin and North American health workers can reach their maximum potential.

COMPREHENSIVE, effective health education programs embrace a wide variety of functions, all of which contribute to the overall goal of improved health practices. These functions may be grouped into the following broad categories:

- Planning the educational phases of programs designed to meet specific health problems of a community.

- Developing educational skills to carry out the program.

- Producing educational aids.

- Obtaining community participation in the solution of health problems.

- Stimulating and maintaining an active interest in the health problems of the community and in the action being taken for their solution.

This listing does not indicate the order in which activities should be undertaken, nor does it indicate priority of importance. At particular times or at specific stages of development,

different functions will be given major emphasis. Neither is there implied any rigid standardization of action for all communities, for programs must be developed to meet the needs and interests of the people concerned. The list provides, however, a convenient classification with which to evaluate the scope of programs within any given area.

Planning the Educational Phase

Study of the development of the *Servicio* programs in the Latin American countries showed that in the beginning little consideration was given to the educational phases of the service or action programs. Emphasis was placed on immediate services, such as establishing a safe water supply, providing adequate sewage disposal, immunizing a population against diseases, and building and staffing preventive and curative medical clinics. These activities were planned with primary consideration for technical efficiency and effectiveness. The concepts of health, the attitudes, and the customary health practices of the people for whom these services were provided were given minor attention.

Later, as it became apparent that people must be willing to practice behaviors conducive to health if the full advantages of a health program are to be realized, the importance of systematic health education began to be stressed. In the planning that followed, emphasis was focused on direct educational programs which

This is the eleventh in a series of excerpts from the Public Health Service's evaluation of the bilateral health programs of the Institute of Inter-American Affairs undertaken during the decade 1942-52. For additional information, see page 1243 of this issue.

were carried on in connection with specific service programs, though not always as part of them. For example, in Chile, the health education personnel of the *Servicio* assisted other staff members in deciding what knowledge and behavior were desirable. They then organized a program for teaching the information and behavior in terms of the educational levels of the individuals for whom it was designed and according to the number of contacts available to the professional personnel doing the work.

Gradually, in some of the programs, the fact that every health service has an educational influence on the recipient came to be recognized. For example, the way in which a physician examines a patient or performs an immunization, or a sanitarian inspects a restaurant, was recognized as contributing to the education of the people. The effect of the education might be good or bad, depending on the extent to which the recipient's needs were being satisfied.

However, oftentimes health activities were being carried on without regard to, or recognition of, the inherent educational opportunities. Many informational and motivational opportunities were being lost simply because the educational potential was not recognized and the activities not planned to result in a favorable learning experience. If the educational as well as therapeutic phases of clinic service, for example, had been a part of planning, even though an excessively heavy caseload was carried by many health personnel, the activities would have been more meaningful and might have resulted in a reduction of readmissions to the health center and probably would have avoided creation of some antagonisms.

For example, in one community half a dozen persons displayed health department prescriptions saying bitterly, "The paper cannot cure." The physician had prescribed medicines which cost far more than the people could pay. A little more attention to the behavioral aspect of the problem during the consultation would have suggested the need for an alternative method of treatment or for assistance in securing additional financial resources. Consideration of both the patients' needs and economic limitations would have developed more favorable attitudes toward the health center.

At the time of the survey, there still existed



Word-of-mouth is supplemented by demonstration and participation as a public health educator in Colombia works with a group of pregnant mothers on problems of diet.

among some of the health personnel the attitude that health education takes place only when teaching is done and that only the health educator should engage in health education. There was an obvious need for wider acceptance of principles such as these:

1. Health education is most effective when all health personnel, as well as other personnel engaged in educational effort, plan for the contribution each can make to meeting the health needs of a community.

2. Even though planning by one individual may appear to be logical and timesaving, such planning seldom results in concerted effort by all persons who have a part to play in carrying out the plan.

3. Emphasis in planning is best placed on the ways in which people learn and change their behaviors, rather than on the information professional people think should be given.

Development of Educational Skills

Possession of technical knowledge does not insure competence in stimulating learning among others. In addition, an understanding of the factors that influence changes in behavior and the development of skills in providing learning experiences for people are necessary. Certain of these factors and skills were identified as follows:

Understanding of the motivational forces for learning.

Ability to learn and respect the traditions,

social customs, and value systems of people, and ability to find ways in which education programs can fit into them.

Skill in stimulating a feeling of need when a problem is not recognized.

Competence in stimulating a desire to change.

Ability to find ways in which information can be made meaningful.

Skill in finding and developing channels of communication.

Ability to help people find solutions for their problems.

In the programs of a number of countries, the need to develop such skills has been recognized. Much of the emphasis, however, has been given to the training of teachers. Projects have included correspondence courses for rural elementary teachers in Bolivia, vacation courses in a number of countries, a textbook on health education for primary school teachers in Colombia, and a 5 months' course for normal school teachers in Brazil.

Top priority was being given to inservice training programs in Brazil. Recently, all key field personnel were brought together for a week of intensive orientation on supervision and teamwork in public health. Using a combination of the roundtable discussion and the workshop approach, and assisted by contributions from a cultural anthropologist, the group of physicians, engineers, and nurses developed a better understanding of how to work together more effectively in meeting the health needs of the community.

In both Chile and Brazil, health educators have worked with schools of public health toward the end of enriching the curriculum in health education. The need to develop practical field experiences in health education as an integral part of the preparation of public health workers is recognized as an urgent one.

Much still remains to be done in both pre-service and inservice training in developing an understanding of the learning process and the ways in which educational experiences can be made meaningful. One of the biggest challenges to the cooperative programs is to develop methods for applying the latest findings of the social sciences in practical education programs.

Production of Educational Aids

Most of the educational effort in a majority of the countries has been devoted to the production of materials, and the tendency has been to make other activities supplementary to this one. In the beginning, centralized production in Washington of educational materials for the use of all the countries was thought to be an economical and effective method for disseminating information. This practice was later abandoned because differences in the culture, customs, language, and problems of the people in the various countries made such production impracticable.

At the time of the survey, however, in many of the countries materials were still being developed at the national level with little regard to the needs of the several sections of the country in which they might be used, or the existing differences in culture, customs, literacy, or terminology.

Frequently, expensive materials were produced when perhaps less expensive ones would have served equally well as aids to learning. Most of the work apparently was focused on the production of mass media for informing the people, with little attention to the development of teaching aids.

There was practically no evidence of an evaluation of the materials developed in terms of what was learned from them. The measures of effort were usually the number of pamphlets distributed, the size of the audience for radio programs or movie showings, with no data on the number and kinds of people who had learned anything from the material to which they were exposed.

Educational materials should be considered as aids to a cooperative health education program and not as the program itself. More adequate planning of programs in terms of learning and more attention to training of personnel in educational procedures should result in the demand for, the production of, and effective use of, better educational materials.

Insofar as possible, all educational aids should be pretested through preliminary trial use with representatives of the group for which they are intended before they are finally produced and distributed. Much time and money may be saved through such pretesting.

Obtaining Community Participation

Opportunity to study the cooperative programs at firsthand gave emphasis to the principle that only with community participation can health programs be successful. These programs do not operate in a vacuum; rather, they are affected by innumerable forces arising from all aspects of community life.

There was considerable evidence of collaboration by various professional groups. For example, in one state in Brazil a committee composed of both health and education authorities was developing a plan for an overall school-community health program. Similar cooperative arrangements were found at the national level in several of the countries.

There was also some evidence that people in the community were working together to solve health problems. However, in some instances, the importance of the community effort had not yet been recognized by the professional health workers. Until health personnel understand the importance of having the people of the community work with them on health problems, maximum results will not be achieved from the programs developed.

With a view to their value in extending the limited community work observed in Latin America, the following suggestions, based upon experience and tested principles in furthering community participation, are offered:

1. A wide variety of social, psychological, educational, cultural, and related factors are to be considered in the planning and establishment of effective health services in any given local area. In a health education program, as in other health programs, functional knowledge of current attitudes, beliefs, customs, traditions, value systems, superstitions, and habits in relation to health and to everyday living is essential.

2. The expressed needs and interests of the people themselves are an important motivating influence for initiating individual, family, and community activities in solving health problems.

3. All communities, no matter how small, have an organizational structure on which to build. Potential avenues for reaching people



Health education artists of the Servicio Cooperativo interamericano de Salud Pública in Colombia prepare education materials. Examples of their work appear on the walls.

exist and can be used for building community participation and cooperation.

4. There is no single pattern for solving community problems, since problem solving is essentially a creative process.

5. The creation of opportunities for people from all walks of life to become active partners in studying community health problems and in planning and carrying out health activities is an important component of health programs.

6. Problems and practices in health are bound together with many other aspects of daily living, for example, education, recreation, housing, social welfare, and earning a livelihood. Hence, health programs should be integrated with and related to problems, services, and resources concerned with the total well-being of the individual and the community.

7. The solution of health problems by a community provides an opportunity for fostering local, individual, and group initiative, pride, ownership, and responsibility. People are more likely to put into daily practice those learning experiences in which self-initiative and self-help are focal points in the education program.

8. A fundamental faith and belief in people's ability to contribute to the solution of their own problems is essential for effective and lasting health education.

Stimulating Interest

In some of the countries, public relations activities designed to stimulate and maintain ac-

tive interest in community health problems and programs were considered, along with the use of mass media, as the most important aspect of health education. In others, it was recognized that a good service program is the best approach to good public relations. The latter point of view is likely to result in the stronger and more permanent interest in and support of community health programs.

Role of Health Educators

During the early years of the bilateral health programs, health education consultants on the staff of the Institute of Inter-American Affairs visited most of the Latin American countries and concluded that the training of personnel in health education was one of the most outstanding needs. Consequently, in 1944, personnel were recruited, one from each of a number of countries, and given a year's training in health education in the United States. It was planned that these people would return to develop health education programs in their respective countries. Only a few of these individuals, however, were still working in health education at the time of the survey.

In recent years, health education consultants have been assigned to three countries. They have provided limited consultation to other countries. It appears that the countries served by full-time North American consultants have made the greatest progress in the development of comprehensive health education programs.

Many of the chiefs of field parties indicated a desire to strengthen the health education programs in their countries, but had not had full-time technical help to develop programs in terms of the specific needs of the country. There was a general feeling in many of the countries that a physician should be the director of the program. This attitude apparently sprang from considering health education only in terms of scientific content, with little regard for competence in educational methods and procedures.

Training Health Educators

In terms of long-range planning, the early selection and training of health educators for

service in Latin America is very important. If possible, health educators should be trained in Latin American institutions. This may well require strengthening of the health education programs in the existing public health faculties in Puerto Rico, Brazil, Chile, and Mexico. Assistance from the Institute of Inter-American Affairs in this work might include purchase of equipment and assignment of personnel to participate in curriculum planning, demonstration teaching, and supervision of field training.

The professional health educator should have a bachelor's degree, preferably with a major in education or social science. A postgraduate degree should be obtained from one of the public health faculties of Latin America. Following postgraduate training and at least 3 years of field experience, professional health educators might well be given a fellowship for training in the United States, where they may observe and participate in the health education programs in local or State health departments and supervision of field training.

At present, the number of persons qualified for postgraduate training in many of the countries is so limited that it seems necessary to accept for training individuals without degrees if current emergency personnel needs are to be met. Several methods of obtaining the essential people are under way. In Chile, the primary focus is on the preparation of health educators and teachers to work through the schools to the community. In Peru and Brazil, plans are being formulated to train health education auxiliaries who have had primary or secondary education and to assign them to local or district programs to provide educational service in the community.

Latin American countries are making tremendous efforts to raise the educational level of their people. As more and more people become better prepared educationally, these short-term training programs will need to be revised accordingly. Otherwise, health education in these countries will be disastrously restricted because personnel with limited preparation are not equipped to carry out the many complex functions of health education in an advanced society.

CDC 1951-1952 Activities

Public Health Service Publication No. 302. 43 pages. Tables; charts; illustrations. Available on request to the Communicable Disease Center, Public Health Service, Atlanta, Ga.

This is a summary of major activities of the Communicable Disease Center during the fiscal year 1952. Abstracted from basic reports, the material presented here emphasizes composite end results and brings into common focus the varied activities of the several components of the center.

The report is divided into two general parts: General Activities, and Activities Directed Toward Specific Diseases or Problems. It is not a complete catalog of projects undertaken during the year, the intent being, rather, to indicate in general terms of scope, nature, and interrelationships of activities carried on in different areas of public health by the combined staff of the CDC.

A Comprehensive Program for Water Pollution Control for the Red River of the North Basin

Public Health Service Publication No. 293. 1953. 7 pages. Maps. Available on request to the water pollution control agencies of Minnesota, North Dakota, and South Dakota from the Basin Office, and from the Division of Water Pollution Control, Public Health Service, Washington 25, D. C.

The Red River of the North Basin, formed by the junction of the Ottertail and Bois de Sioux, forms the boundary between North Dakota and Minnesota as it flows northward. The basin contains 90 municipalities with sewer systems which serve a total population of 189,200. Industrial wastes contribute a population equivalent of 76,000 to mu-

nicipal sewer systems for a total untreated population equivalent of 265,200.

Despite the fact that 75 percent of the sewer municipalities and 65 percent of the industrial establishments provide treatment for their wastes, discharge of insufficiently treated wastes creates a health problem. Water quality for industrial uses, irrigation, and stock watering is also impaired.

This publication outlines a water pollution control program based upon the findings of a number of stream studies, surveys, and investigations undertaken by the health departments and water pollution control agencies of North Dakota, South Dakota, and Minnesota. Included are suggested improvements in treatment facilities for the towns in the area.

In conformance with the Water Pollution Control Act of 1948, the Public Health Service has adopted the comprehensive program developed by the States as meeting the requirements of the law.

The Dog in Medical Research

Public Health Service Publication No. 312. 1953. 19 pages. 20 cents.

In July 1949 a pamphlet was prepared by the surgery study section of the Division of Research Grants, National Institutes of Health, entitled "Care of the Dog used in Medical Research" (Supplement 211 to *Public Health Reports*). It included brief discussions on: animal research and medical progress; public relations; procurement; selection of dogs for specific purposes; care and handling; quarters; and feeding.

This publication is a revision of the earlier pamphlet and features a more comprehensive review of procurement problems and methods, as well as amplification of information on care and handling of the dog. It

was prepared particularly for the use of institutions and individuals receiving Public Health Service research grants, with the hope that the standards and recommendations would be used as a guide by all institutions using dogs for research.

The committee which prepared the revised addition consisted of Drs. Claude S. Beck, professor of cardiac surgery, Western Reserve University; W. T. S. Thorp, chief, section on comparative pathology, National Institutes of Health; and C. F. Schlotthauer, Mayo Foundation, Rochester, Minn.

Aortography by Percutaneous Catheterization of the Femoral Artery

Public Health Service Publication No. 283. 1953. 6 pages; illustrated. Available on request to the National Heart Institute, National Institutes of Health, Public Health Service, Bethesda 14, Md.

This publication, prepared for physicians, explains a method to improve the contrast study of the aorta. Percutaneous catheterization of the aorta via the femoral artery followed by X-ray examination makes possible the visualization of any portion of the aorta.

Materials and methods for use in abdominal and thoracic aortography are described. The advantages of the commonly used aortographic methods are compared, and a bibliography of percutaneous femoral artery aortography and of other methods is appended.

The Preschool Child Who Is Blind

Children's Bureau Folder No. 39. 1953. 23 pages. Illustrated. 10 cents.

The fourth in a series designed to help parents of a child with a handicapping condition, this booklet stresses the fact that the child who is born blind is more like a seeing child than different from him, and

technical publications

is of the same average ability. If the blind child gets the opportunity, he can learn to do almost everything that the child with sight can do.

The booklet tells how the parents of a blind child can help him develop skills and abilities and have the experiences of normal life. Attention is called to community facilities and agencies which can help parents.

A Comprehensive Program for Water Pollution Control for the Yakima River Basin

Public Health Service Publication No. 292. Water Pollution Series No. 51. 1953. 15 pages; tables; maps. Available from the Washington Pollution Control Commission, Olympia, Wash., and from the Division of Water Pollution Control, Public Health Service, Washington, D. C.

The Yakima River system drains an area of 6,000 square miles located on the eastern slope of the Cascade Mountain Range and lower plateau in central Washington, one of the oldest irrigated agricultural areas in the Pacific Northwest. The total combined wastes reaching the water courses from the 22 municipalities, institutions, and other population centers, and 33 industrial establishments have a population equivalent of 200,000.

During the summer of 1951, the Washington Pollution Control Commission conducted a water-quality survey in the Yakima River area. Their findings indicated that although substantial progress has been made in correcting conditions, the pollution problem is still causing serious damage and interfering with the valuable uses of the waters in the basin.

This publication discusses the water-use and water-quality objectives developed by the Washington Pollution Control Commission for the

basin. It also outlines the comprehensive program adopted to meet these objectives. Municipal requirements are given for various cities and industrial requirements for specified industries in the area. Appendixes include water quality objectives and minimum treatment requirements developed by the commission and minimum requirements for prevention of industrial waste pollution.

In conformance with the Water Pollution Control Act of 1948, the Surgeon General of the Public Health Service has adopted the Washington Pollution Control Commission's program as a comprehensive program meeting the requirements of the law.

The Virus and the Cell

Burnet, Sir F. Macfarlane, F. R. S. The R. E. Dyer Lecture 1952. Public Health Service Publication No. 328.

The second R. E. Dyer lecture at the National Institutes of Health, Public Health Service, was presented October 29, 1952, by Sir F. Macfarlane Burnet, director of the Walter and Eliza Hall Institute of Medical Research in Melbourne, Australia. This publication contains the text of Dr. Burnet's talk, as well as the introductory remarks of Dr. W. H. Sebrell, Jr., director of the National Institutes of Health and Dr. L. T. Coggeshall, dean, division of biological sciences, University of Chicago.

Dr. Burnet spoke on the interaction of influenza virus with the cell it parasitizes. He noted first that there is a basic similarity between the action of a bacterial virus on a coliform bacillus and the action of the influenza virus on the cells of the human respiratory tract or those of laboratory animals. The process of the interaction takes place in four steps: (1) Adsorption to the cell surface, at first reversible, then definitive; (2) entry of the virus into

the cell and its disappearance as an infective entity; (3) an eclipse phase toward the end of which manifestations of virus activity, hemagglutinin, and complement-fixing antigen appear a little before infective virus; and (4) the gradual accumulation of new virus and its progressive liberation into the fluid without, in this stage at least, any gross morphological damage to the cell.

Dr. Burnet discusses each of these phases in detail in light of the progress that has been made in the understanding of them. He gives particular emphasis to the genetic approach, saying "it is clear that the intracellular multiplication of viruses cannot be regarded as simply a matter of binary fission plus the occasional appearance of a mutant form. Multiplying genetic mechanisms can in some way interact to give recombination of qualities in some of the descendants."

In his conclusion Dr. Burnet points out two lines along which we may look for important advances in virus research: that of the genetic approach; and an attack on the nature of the soluble complement-fixing antigen. "If the idea is correct that the antigen is essentially a host cell component bearing a virus 'pattern,' we may have in our hands a clue to what most biologists would, I think, agree is the central problem of biological chemistry—the replication of organic pattern within the cell. If we can implant at will into the cell new patterns to which the cell will respond by the production of detectable replicas, we should possess a tool of great power."

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Author, Title, Subject Index

A

- Abatement of stream pollution caused by industrial wastes [Eliassen]----- 43
- ABBE, LESLIE MORGAN: *See* Cronin, John W. (Odoroff and Abbe).
- Absenteeism: *See* Industrial sickness.
- Accepted dental remedies [Doty] (B)----- 516
- Accidents:
- Childhood, study of, by Children's Bureau (SR)----- 1070
 - Fatalities, Tennessee, 1946-50----- 301
 - Frequency of, as recorded in family surveys (MS)----- 993
 - See also* Part 2, Monograph No. 14.
- Adams, Edgar M. (CR)----- 211
- Adams, Harold S. (CR)----- 243
- Adams, Irma L. (CR)----- 233
- Adoptions, Children's Bureau reports on (SR)--- 404
- Adult guidance center, San Francisco [Johnston]. 590
- Aged, employment of----- 20
- Agenda for a critical exploration of current problems in medical care [Bluestone]----- 1225
- Agglutination of *Treponema pallidum* in syphilitic serums [McLeod and Magnuson]----- 747
- Aggregate community picture, psychosocial aspects of cancer [Nicholson]----- 153
- Air pollution, a growing community problem--- 858
- Air pollution and man's health in:
- Detroit [Linsky] (B)----- 870
 - Great Britain [Isaac] (B)----- 868
 - Los Angeles [Larson] (B)----- 872
- Alaska:
- Science and public health research in----- 527
 - Tuberculin sensitivity in----- 23
- Alaskan Science Conference, 3d: *See* Conference report: Alaskan Science, 3d
- Alcoholics, clinics for, in San Francisco----- 590
- Allergy: *See* Pollenosis
- ALLPORT, GORDON W.: Teaching-learning situation----- 875
- Almy, Thomas P., appointed to the Cancer Control Committee of the National Cancer Institute----- 1230
- Alter, Amos J. (and Porter): Water pollution studies in Alaska (B)----- 539
- Altman, J. S. (CR)----- 92
- AMERSON, J. BURNS: Treatment of tuberculosis----- 928
- American Association for the Advancement of Science symposium: *See* Drug therapy: Symposium.
- American Heart Association Council on Rheumatic Fever and Congenital Heart Disease, statement: prevention of rheumatic fever---- 12
- American Medical Association:
- Goldberger Award, clinical nutrition, to William H. Sebrell, Jr.----- 738
 - Rural Health Conference: *See* Conference report, Rural Health, 8th national, sponsored by AMA.
- American medicine in a changing society [Hobby]----- 756
- American Public Health Association:
- 80th annual meeting: *See* Conference report.
 - Origin ----- January ii
 - Southern Branch experiment in curbstone consultation----- 1213, 1217
- AMOS, FRANKLYN B.: Public health training program of New York State----- 295
- Analysis of ratbites in Baltimore, 1948-52 [Sallow]----- 1239
- Anchorage, Alaska, food study [Scott and Weiss] (B)----- 541
- Anderson, Gaylord W.: APHA 80th annual meeting address (E)----- 81, 85
- Anderson, Odin W. (CR)----- 218
- Anderson, Robert J. (CR)----- 113
- ANDERSON, ROBERT J. (Sauer and Robertson): Tuberculosis cases known to health departments----- 641
- ANDREWS, JUSTIN M., appointed Assistant Surgeon General and associate chief of the Bureau of State Services (SR)----- 30
- Andromedotoxin, process for extracting (SR)---- 1098
- Animal diseases (CR)----- 263
- Animal-borne diseases, in Alaska [Rausch] (B)--- 533
- Annual report of the Public Health Service, Federal Security Agency, 1952. A review---- 637
- Anthrax:
- Epidemic curbed in Paraguay (SR)----- 623
 - Epidemiology and control (CR)----- 205
 - In the United States [Steele and Helvig]--- 616
- Anthropological methods and data, use of, bilateral health programs, Latin America----- 841
- Antimalarial activity of 4,000 compounds (MS)--- 56
- Antirabies horse serum, reactions to----- 789
- Armbruster, Edward H. (CR)----- 261
- Arnold, Francis A., Jr., named new director of the National Institute of Dental Research, National Institutes of Health (SR)----- 390
- ARNOLD, FRANCIS A., JR. (Dean and Knutson): Effect of fluoridated public water supplies on dental caries prevalence----- 141
- Ast, David B. (CR)----- 222, 233, 251

AUFBRANG, W. H. (and Shepard): Effect of Public Law 779 on teaching and research at public health schools.....	656
Augustine, Donald L.: Low-temperature treatment, trichinosis (B).....	419
Axelrod, S. J. (CR).....	121

B

Bacteriological research (CR).....	90, 108, 199
Bachr, George (CR).....	132
Bailey, Albert E. (CR).....	233
Bakst, Henry J. (CR).....	92
Baldwin, J. M. (CR).....	262
Baldwin, Ruth (CR).....	256
Banta, Park M., named general counsel, HEW (SR).....	496
Baris, Yetta (CR).....	243
Barrow, J. Gordon (CR).....	83
Barry, Francis E. (CR).....	219
Bartsch, Walter C. (CR).....	244
Bassett, Garry G. (CR).....	132
Bauer, Louis H. (CR).....	487
Bauer, Theodore J., appointed chief of the Communicable Disease Center (SR).....	30
BAUER, THEODORE J.: Half a century of international control of the venereal diseases.....	779
Baumgartner, Leona (CR).....	122
BAUMGARTNER, LEONA: Maternal and child health services—Challenges and aims.....	397
Beck, Dorothy Fahs (CR).....	98
Beds: See Hospital.	
Belloe, Nedra B. (CR).....	270
Bennett, Barbara (CR).....	96
Bennett, Emily (CR).....	124
Benson, Margaret E., appointed chief of infectious and tropical disease nursing of the Clinical Center (SR).....	777
BEVIS, HERBERT A. (Tetzlaff and Taylor): Disinfecting garbage in truck bodies by direct steam injection.....	1065
Bice, Harry V. (CR).....	129
Bierring, Walter L. (CR).....	133
Billings, Clayton H. (CR).....	269
Birkeland, J. M. (CR).....	262
Birth and early days of Florida's first county health unit [Smith].....	1088
Birth statistics in maternal and child health programs [Haenszel].....	71
BLACK, JAMES (Lynch and Ladimer): Program for protection of research employees against pathogenic hazards.....	989
Blind, rehabilitation of.....	367
Blindness: Case finding for glaucoma.....	1059
Blood, Benjamin D.: Hydatid disease control (B).....	534
Bloodgood, Don E. (CR).....	245
Bluestone, E. M. (CR).....	271
BLUESTONE, E. M.: Agenda for a critical exploration of current problems in medical care.....	1225
Bodily, Howard L. (CR).....	104

Boeker, Elisabeth, sent to Iraq under Point IV program (SR).....	777
Boles, Russell S., appointed to Cancer Control Committee of National Cancer Institute (SR).....	1230
Bonner, C. C.: See Part 2, Monograph No. 12.	
Bosch, Herbert M. (CR).....	203
Bosley, Bertlyn (CR).....	275
Boudreau, Frank G.: National Conference on World Health address (E).....	604
Brady, Frederick J., appointed alternate representative to World Health Organization Executive Board (SR).....	874
Brand, Morris A. (CR).....	271
Braun, Daniel C. (CR).....	212
Braun, Werner (CR).....	109
Brazil, schistosomiasis control in.....	1156
Breslow, Lester (CR).....	270
BRESLOW, LESTER: Occupational factors in lung cancer.....	286
Brewer, A. Frank (CR).....	137
Brewster, Agnes W. (CR).....	122
BROOKE, MARION M.: See Goldman, Morris (and Brooke).	
Bross, Irwin (CR).....	130
Browe, John H. (CR).....	125
Brower, J. W. (CR).....	233
Brown, Emily S. (CR).....	216
BROWN, ROBERT R.: See Hankinson, Denzel J. (Read, Litsky, and Brown).	
Brownell, Samuel M., named Commissioner of Education, HEW (SR).....	1051
Brucellosis, serology of, in Indiana.....	563
Brunstetter, Byron C., Division of Research Grants, National Institutes of Health, death of (SR).....	1090
Bryan, A. Hughes (CR).....	274
Buchanan, Josephine J. (CR).....	84
Buchbinder, Leon (CR).....	243
BUREN, WILLIAM F.: See Norris, Edgar W. (Schneider, Hanchett, Kohler, and Buren).	
Burnet, Sir F. Macfarlane (CR).....	100, 102
Burnet, Sir F. Macfarlane: Dyer lecture, 1952 (E).....	1145
BUSH, VANNEVAR: We are in danger of building a Tower of Babel.....	149
Bushel, Arthur (CR).....	251
Business methods and standards in health administration (CR).....	229
Byington, Garner M. (CR).....	139

C

California, encephalitis, 1952.....	369
CAMERON, CHARLES M., JR.: Organizing mass gamma globulin clinics in three North Carolina counties.....	1025
CAMERON, DALE C.: Public health aspects of civil defense.....	1091
Cameron, Janet L. (CR).....	485
Campbell, Charlotte C. (CR).....	110

Cancer:		Climate and endemic dental fluorosis [Galagan and Lamson].....	497
Community organization.....	153	Cline, Joseph K.: <i>See</i> Part 2, Monograph No. 12.	
Control projects and research (CR).....	95	Clinical Center:	
<i>Excerpta Medica</i> adds new section on (SR).....	1024	Dedicatory speeches:	
Morbidity studies in metropolitan areas.....	975	Hobby, Oveta Culp.....	904
Occupational factors in lung.....	286	Scheele, Leonard A.....	907
Psychosocial aspects of, five reports (SR).....	152	Sebrell, William H., Jr.....	908
Recent progress in, research.....	309	Laboratory and clinical research in medicine and public health.....	897
Research grant applications (SR).....	770	List of publications giving additional details.....	906
Tests, diagnostic, development and evaluation (MI).....	880	Structure of the building.....	901
<i>See also</i> Part 2, Monograph No. 12.		Coatney, G. Robert: <i>See</i> Part 2, Monograph No. 9.	
Twenty-six years of, control in Massachusetts.....	647	Coffey, Joseph H. (CR).....	268
<i>Cancer Control Letter</i> discontinued (SR).....	1236	Cohart, Edward M. (CR).....	97, 227
Candau, M. G., appointed WHO Director-General (SR).....	634	Cohen, Bernard M. (CR).....	277
Capillary tube technique for serologic screening of syphilis [Freeble and Orsburn].....	341	COLBY, EDWARD W.: Reexamining health record forms.....	1209
Cardiovascular syphilis in a general medical clinic [Lucia, Harp, and Hunt].....	405	Collins, Selwyn D.: <i>See</i> Part 2, Monographs Nos. 10, 14, 16.	
CARROLL, BENJAMIN E.: <i>See</i> Kurlander, Arnold B. (and Carroll).		Come-up time method of milk pasteurization [Hankinson, Read, Litsky, and Brown].....	769
Carson, Maude B. (CR).....	233	Comments on symposium, sound drug therapy [Zopf] (B).....	517
Case finding:		Communicable diseases, seasonal occurrence of, 1951 and 1952.....	194
Glaucoma, in Philadelphia.....	1059	Community health organization (CR).....	86
Selective, in syphilis control.....	167	Community program for the prevention of rheumatic fever recurrence [Smith].....	16
Through multiple screening [Kurlander and Carroll].....	1035	Complement fixation tests for murine typhus on small mammals [Keaton, Nash, Murphy, and Irons].....	28
Cass, Julius S. (CR).....	222	Condit, Philip K. (CR).....	137
Challenge of the first week of life.....	April ii	Conference report: Alaskan Science, 3d, sponsored by the American Association for the Advancement of Science's Alaska Division:	
CHANG, CHARLES C.: <i>See</i> Forbes, Gilbert B. (and Chang).		Anchorage food study [Scott] (B).....	541
Chang, Te Wen (CR).....	263	Animal-borne diseases [Rausch] (B).....	533
CHAPMAN, A. L.: An experiment with group conferences for weight reduction.....	439	Distemperlike disease [Reinhard] (B).....	535
Chemical labeling committee reactivated.....	66	Editorial introduction.....	527
Chemistry award to Alton Meister.....	1106	Enteric diseases [Pauls] (B).....	531
Cheney, Bess A.: <i>See</i> Part 2, Monograph No. 13.		Hydatid disease control [Blood] (B).....	534
Child health: <i>See</i> Maternal and		Mastoiditis [Fritz] (B).....	537
Child Health Day. A proclamation by the President of the United States.....	396	Mosquito control [Wilson] (B).....	536
Child Health Day, May 1, 1953 [Hobby].....	396	Social sciences [Lantis] (B).....	528
Children's Bureau:		Trend of science [Lantis] (B).....	528
Appointments: <i>See</i> Individual's name.		Two water systems in northern Canada [Copp] (B).....	538
<i>Child, The</i> , reports from.....	760, 1131, 1238	Water pollution studies [Alter] (B).....	539
Child health and welfare.....	183	Conference report: American Public Health Association, 80th annual meeting:	
Health services and juvenile delinquency.....	572	Part I:	
Publications: <i>See</i> Publications: Title of.		Bacteriological research.....	90
Reports 1951 adoptions (SR).....	404	Cancer control.....	95
Studies childhood accidents (SR).....	1070	Chronic illness and rehabilitation.....	83
Chipman, Sidney S. (CR).....	225	Community health organization.....	86
Chisholm, Brock: National Conference on World Health address (E).....	602	Editorial introduction.....	82
Chronic disease mortality during epidemic: <i>See</i> Part 2, Monograph No. 10.		General practitioner.....	132
Chronic illness, control and rehabilitation (CR).....	83	Handicapped children.....	127
Church, Brooks D. (CR).....	91		
Civil defense, public health aspects of.....	1091		

Conference report: APHA—Continued

Part I—Continued

Home care.....	92
Industrial hygiene.....	115
Infectious hepatitis.....	130
Laboratory:	
Methods.....	108
Relationships.....	103
Reports.....	99
Medical administration.....	118
Mountain memorial.....	134
Overseas reports.....	99
Poliomyelitis.....	105
Preventive medicine and the general practitioner.....	132
Professional training.....	138
Public health in transition.....	88
Tuberculosis.....	112
Veneral disease.....	136
Weight control.....	124

Part II:

Animal diseases.....	263
Anthrax.....	205
Dairy products.....	243
Dental health.....	251
Environment.....	202, 236
Fluoridation.....	220
Fly control.....	267
Food sanitation.....	260
Handicapped children.....	256
Health administration.....	229
Health education.....	224
Industrial hygiene.....	209
Medical service.....	269
Mother and child.....	218
Nursing homes.....	228
Public health:	
In transition.....	207
Programs, new elements in.....	273
Surveys.....	254
School health:	
Policies.....	207
Practices.....	213
Research.....	248
Statistics.....	277
Virus laboratory.....	199
Water and sewage.....	245
Water conservation.....	234

Conference report: Public Health Statistics, 2d, sponsored by University of Michigan School of Public Health:

Birth statistics in maternal and child health programs [Haenszel].....	71
Emerson, Haven, remarks (E).....	471
List of papers published in PHR 1952-1953 (SR).....	473
Public health operating statistics [Webster].....	467
Statistics in a health department medical care plan [Taback and Williams].....	157

Conference report: Rural Health, 8th national, sponsored by the Council on Rural Health of the American Medical Association:

Community gets physician.....	486
-------------------------------	-----

Conference report: Rural Health—Continued

County health councils and public health [Yoder] (B).....	489
Dental aspects of rural health in Oregon [Noyes] (B).....	492
Editorial introduction.....	480
Food values in rural areas.....	485
Group health insurance for farm families.....	485
Helicopter transport for patients.....	487
Hospital achieved by community action.....	486
Looking back to look ahead in rural health [Crockett].....	480
Medical care insurance, a responsibility.....	488
Place of the physician in rural health activities [Henry] (B).....	490
Small town practice over big city.....	487

Conference report: State and Territorial Health Authorities, with the Surgeon General of the United States Public Health Service and the Chief of the Children's Bureau:

Announcement of 1953 meeting (SR).....	759
Child health and welfare [Eliot].....	183
Editorial introduction.....	175
Federal-State relations [Thurston].....	181
International health staffing [Hyde].....	188
Programs and problems [Scheele].....	174

Conference report: Trichinosis, 1st national, sponsored by the American Board of Veterinary Public Health and others:

Editorial introduction.....	417
Effect of ionizing radiation [Gomberg] (B).....	419
Federal meat inspection [Miller] (B).....	419
Garbage-borne swine diseases [Steele] (B).....	418
Health and economic problem [Link] (B).....	417
Low-temperature treatment [Augustine] (B).....	419
Prevalence and prevention [Gould] (B).....	419
State problems in control [Sussman] (B).....	420
Transmission and control, human (Chart).....	416
Trichinae in swine [Schwartz] (B).....	418
Trichinosis control and vesicular exanthema [Haldeman, Steele, and Van Derwerker].....	421

Conference report: World Health, national, sponsored by the National Citizens Committee for the World Health Organization:

Boudreau, Frank G. (E).....	604
Chisholm, Brock (E).....	602
Editorial introduction.....	600
Nature of the World Health Organization [Hyde].....	601
Two cooperative projects of WHO and UNICEF [Keeney].....	606
Wadsworth, James J. (E).....	605

Conroy, Elizabeth (CR).....	109
Constitutionality of delegation of legislative powers to State boards of health (LN).....	733
Cook, W. Leigh, Jr. (CR).....	210
Cooper, W. Clark: See Part 2, Monograph No. 9.	
Coordinating medical and nursing records [Dickerson].....	1205
Copeland, Murray M. (CR).....	97

Copp, Stanley S.: Two water systems in northern Canada and Alaska (B).....	538
Cordes, W. A. (CR).....	244
Coriell, Lewis L. (CR).....	106
Council, departmental, formed to aid Secretary of HEW (SR).....	1064
Council on Rheumatic Fever and Congenital Heart Disease of the American Heart Association statement on prevention of rheumatic fever.....	12
Counihan, Donald M., appointed assistant to HEW Secretary as legislative liaison officer (SR).....	801
County health councils and public health [Yoder] (B).....	489
Cousineau, Aimé (CR).....	237
Cox, Charles R. (CR).....	221
Coxsackie virus:	
Antibody and incidence of minor illness during the summer [Walton and Melnick].....	1167
Isolation of, during a summer outbreak of acute minor illness [Melnick, Walton, and Myers].....	1178
Crane, Marian M. (CR).....	259
CROCKETT, F. S.: Looking back to look ahead in rural health.....	480
CRONIN, JOHN W. (Odoroff and Abbe): Hospital beds in the United States in 1953.....	425
Curbstone consultation.....	1213, 1217
Current readings on gamma globulin and poliomyelitis (SR).....	668

D

Daft, Floyd S., named director National Institute of Arthritis and Metabolic Diseases (SR).....	1230
Dail, Martha C. (CR).....	110
Daily, Edwin F. (CR).....	271
Dairy products, examination methods (CR).....	243
DAMON, S. R. (Donham, Hutchings, Simms, and Steele): Serology of brucellosis in rural Indiana.....	563
Dana, George W. (CR).....	133
DAUER, C. C.: 1952 summary of foodborne, waterborne, and other disease outbreaks.....	696
Poliomyelitis distribution in the United States, 1952.....	1033
<i>See also</i> Davis, Dorland J. (and Dauer).	
DAVIS, DORLAND J. (and Dauer): Occurrence of influenza in the United States, 1952-53.....	1141
Davis, J. Wilfrid (CR).....	120
Day, Emerson (CR).....	98
Dean, H. Trendley (CR).....	220
Dean, H. Trendley, director of the National Institute of Dental Research, National Institutes of Health, retires (SR).....	390
DEAN, H. TRENDLEY: <i>See also</i> Arnold, Francis A., Jr. (Dean and Knutson).	
Dean, Joseph O., appointed an assistant to the medical director of the Bureau of Indian Affairs, Department of the Interior (SR).....	1122
DEARING, W. PALMER: New orientation in the teaching of preventive medicine.....	1147

Deisher, Robert W. (CR).....	139
Delinquency: <i>See</i> Juvenile delinquency.	
Demographic characteristics of Latin America....	1123
Dental aspects of rural health in Oregon [Noyes] (B).....	492
Dental care services for school children [Waterman and Knutson].....	583
Dental health:	
Aspects of, in Oregon (B).....	492
Dental care services for school children... 583, 1192	
Dental caries prevalence, effect of fluoridated water.....	141
Partnership in.....	1221
Two State programs; malocclusion assessment; patient-dentist relationship (CR)...	251
<i>See also</i> : Fluoridation; Fluorosis.	
Department of Health, Education, and Welfare: <i>See</i> United States Department of.	
Derryberry, Mayhew (CR).....	226
Derryberry, Mayhew: <i>See also</i> Part 2, Monograph No. 8.	
DERRYBERRY, O. M.: Health conservation activities of TVA.....	327
DeTar, J. S. (CR).....	133
Developing trends and standards of sound drug therapy. A symposium of the AAAS.....	509
Development and evaluation of cancer diagnostic tests [Dunn and Greenhouse] (MI).....	880
Diabetes:	
Interest of public health in.....	624
Mortality by State, 1950.....	822
Training courses in control of (SR).....	433
Diarrhea control.....	361
DICKERSON, L. A.: Coordinating medical and nursing records.....	1205
Dickman, Albert (CR).....	103
Diefenbach, William C. L. (CR).....	131
DIEHL, HAROLD S.: Professional education in public health. A survey of schools of public health, 1950.....	890
DiMaggio, Gellestrina (CR).....	128
Dining car sanitation award (SR).....	810
Diphtheria, incidence by geographic divisions...	67
Disaster relief, Public Health Service.....	630
Disease outbreaks, foodborne, waterborne, and other, 1952 summary.....	696
Diseases: <i>See</i> Name of disease.	
Disinfecting garbage in truck bodies by direct steam injection [Bevis, Tetzlaff, and Taylor].....	1065
Distemperlike disease in Alaska [Reinhard] (B).....	535
Distribution of hospital nursing services [Tibbits].....	933
DOBROVOLNY, CHARLES G.: <i>See</i> Wright, Willard H. (and Dobrovolny).	
DODGE, HAROLD R.: Identifying common flies...	345
Doefler, Leo G. (CR).....	258
Domke, Herbert R. (CR).....	233
Donaho, John A. (CR).....	232
DONHAM, C. R.: <i>See</i> Damon, S. R. (Donham, Hutchings, Simms, and Steele).	
Doty, J. Roy: Accepted dental remedies (B)....	516
Dowling, Harry F. (CR).....	273

Harris, Elisha: Origins of the American Public Health Association.....	January	ii	Henry, Charles Reid: The place of the physician in rural health activities (B).....	490
Harris, Jane S.: <i>See</i> Part 2, Monograph No. 8.			Hepatitis, infectious:	
Harshfield, Gerald S. (CR).....	263		Gamma globulin in the prophylaxis of.....	659, 661
Hartmann, Margot D. (CR).....	258		Studies in spread patterns of (CR).....	130
Harton, William R., Jr. (CR).....	232		HEW: <i>See</i> United States Department of Health, Education, and Welfare.	
Haskell, Henry G., Jr., named secretary of HEW Departmental Council (SR).....	1064		Heyroth, Francis F. (CR).....	220
Hatch, Theodore (CR).....	204		Hiatt, Eugene W. (CR).....	229
Hay, James R. (CR).....	205		Hicks, Dora A. (CR).....	214
Hay fever: <i>See</i> Pollenosis.			Hightower, John A. (CR).....	264
Hayes, A. J. (CR).....	116		Hill, Jack H.: <i>See</i> Part 2, Monograph No. 12.	
Health authorities, State and local, regulatory powers and duties of.....	434		Hill-Burton, 1,300 projects completed (SR).....	1116
Health conservation activities of TVA [Derryberry].....	327		Himmelsbach, Clifton K., appointed assistant chief of the Division of Hospitals (SR).....	954
Health department manpower (MS).....	909		HIMMELSBACH, C. K., <i>See</i> Mordell, J. Solon (and Himmelsbach).	
Health developments in rural America, 1953....	480		Hirschberg, Nell (CR).....	111
Health education:			Hirschboeck, John S. (CR).....	87
Effect of Public Law 779 on teaching and research at public health schools [Aufranc and Shepard].....	656		Hiscock, Ira V. (CR).....	254, 275
Evaluation studies (MS).....	54		Histoplasmin and tuberculin sensitivity in Texas infants and children [Forbes and Chang].....	320
Field research and appraisal (CR).....	224		Histoplasmin sensitivity in Mississippi—A new boundary [O'Neal].....	714
In <i>Servicio</i> programs.....	1258		Hobby, Oveta Culp:	
Preventive medicine teaching, new orientation.....	1147		Appointed new Federal Security Administrator (SR).....	193
Professional education in public health.....	890		Becomes first Secretary of the U. S. Department of Health, Education, and Welfare (SR).....	496
Sanitary engineers, recipients of master's degrees.....	717		HOBBY, OVETA CULP: American medicine in a changing society.....	756
Scholarship loans, medical, in Mississippi..	549		Child Health Day.....	396
Schools, public health, 1950 survey.....	890		Clinical Center dedicatory speech (E) ..	August
Via television.....	816		"Symbol of our national concern for the health of our people," (Clinical Center dedicatory address).....	904
<i>See also</i> Part 2, Monograph No. 8.			Holaday, Duncan A. (CR).....	211
Health hazards, program for protection of research employees.....	989		Hollinger, Nell F. (CR).....	273
Health occupations: 1950 census findings.....	191		HOLLIS, MARK D.: Environmental health in a rural economy.....	1107
Health personnel staffing: <i>See</i> Part 2, Monograph No. 13.			Public, professional, industrial allies in sanitation.....	805
Health programs, bilateral, in Latin America: <i>See Servicio</i> : PHS survey of IIAA health program.			Hollister, William G. (CR).....	252
Health services and juvenile delinquency [Eliot]..	572		Holmes, E. M., Jr. (CR).....	94, 232
Heart program:			Holmes, Marion B. (CR).....	262
Demonstration, Newton, Mass.....	16		Homburger, F.: <i>See</i> Part 2, Monograph No. 12.	
Regional (SR).....	350		Home care plans in four cities (CR).....	92
Screening in X-ray surveys.....	415		Hood, Thomas R. (CR).....	233
Hedley, Oswald F., chief of the public health office of the Mutual Security Agency, death of (SR).....	30		Horne, Leroy (CR).....	257
Heely, Patricia (CR).....	107		Hospital:	
Heistad, Octavia, assigned to the Point IV technical aid program in Libya (SR).....	728		Administrators, institute for (SR).....	931
Heister, R. M. (CR).....	235		Beds in the United States in 1953 [Cronin, Odoroff, and Abbe].....	425
HELLER, JOHN R., JR.: Recent progress in cancer research.....	309		Facility for use of radioactive isotopes in a general.....	449
Helper, John M. (CR).....	222		Nursing services in.....	933
Helper, Opal E. (CR).....	199		Rehabilitation in.....	281, 1043
HELVIG, RAYMOND J.: <i>See</i> Steele, James H. (and Helvig).			Survey and construction program, 1,300 projects completed (SR).....	1116
Hemphill, F. M. (CR).....	275		<i>See also</i> Frontispieces.	

GELPERIN, ABRAHAM (and Fuller): Method of simplifying soil percolation tests for septic tank systems.....	693
General regulatory powers and duties of State and local health authorities [Moldenhauer and Greve].....	434
Gentzkow, C. J. (CR).....	104
Gerlach, Lester A. (CR).....	214
Gerrie, Norman F. (CR).....	222
Getting, Vlado A. (CR).....	135
Geyer, H. G. (CR).....	206
GILL, D. G.: Gamma globulin in a poliomyelitis outbreak in Montgomery, Ala., 1953.....	1021
Gish, Charles W. (CR).....	223
Glasser, Melvin, appointed special assistant for State and national organization relations in the Children's Bureau (SR).....	53
Glaucoma case finding in Philadelphia [Hankla].....	1059
Gochenour, William S., Jr. (CR).....	264
Goetz, Alexander (CR).....	239
Goldberg, Harry (CR).....	120
Goldberger, Joseph:	
Award, to William H. Sebrell, Jr.....	738
Biographical sketch of.....	738
GOLDMAN, MORRIS (and Brooke): Protozoans in stools unpreserved and preserved in PVA-fixative.....	703
Goldmann, Franz (CR).....	135
Goldstein, H. E. (CR).....	206
Goldstein, Leah (CR).....	243, 244
Gomberg, Henry J.: Effect of ionizing radiation, on trichina larvae (B).....	419
Good, Charles F. (CR).....	216
Goodlow, Robert J. (CR).....	109
Gordon, Eddie M., appointed medical officer in charge of PHS Hospital, Carville, La. (SR).....	728
GORDON, JOSEPH: Health education via television.....	816
GORDON, TAVIA: Mortality in the United States, 1900-1950.....	441
Goresline, Harry E. (CR).....	266
Goss, Kenneth G. (CR).....	218
Gould, S. R.: Prevalence and prevention of trichinosis (B).....	419
Grand Rapids-Muskegon fluoridation study.....	141
Graning, Harald M. (CR).....	90
Grant, John B. (CR).....	135
Grants and fellowships:	
Cancer research.....	770
Medical research.....	995
Simplifying State accounting for.....	1071
Greenberg, Bernard G. (CR).....	225, 278
Greenberg, Joseph: See Part 2, Monograph No.9.	
GREENBERG, MORRIS: See Siegel, Morris (and Greenberg).	
GREENHOUSE, SAMUEL W.: See Dunn, John E., Jr. (and Greenhouse).	
GREVE, CLIFFORD H.: Provisions of State laws governing local health departments.....	31
(and Connor): State laws on financing and staffing local health departments.....	955

GREVE, CLIFFORD H. See also Ruth H. (and Greve).	
GRIFFITH, ROBERT L. (and McN port of a case of rat-bite fever <i>moniliformis</i>	
GRIGG, WALTER K. (and Wilhelm logical study of plantar warts children.....	
Griswold, Matthew H. (CR).....	
Gronemeyer, Annett L. (CR).....	
Group psychotherapy for weight r	
Growth of local health units in Flo	
GRUMAN, GERALD J.: Preventive m ing program in a venereal diseas	
Guam: Sclerosis, amyotrophic L of, on (SR).....	
Guidotti, Frank P. (CR).....	
Guiteras, Albert F. (CR).....	
H	
Habel, Leo (CR).....	
Hack, Lula (CR).....	
Haeger, Leonard G. (CR).....	
Haenszel, William (CR).....	
HAENZSEL, WILLIAM: Birth statistic and child health programs.....	
Haldeman, Jack C. (CR).....	
Haldeman, Jack C.: See also Part 2 No. 13.	
HALDEMAN, JACK C. (Steele and ker): Trichinosis control and ves thema.....	
Half a century of international com real diseases [Bauer].....	
Halliday, Dean (CR).....	
HALVERSON, WILTON L.: Public hc Western States.....	
(Longshore and Peters): Th cephalitis outbreak in California...	
Hammon, William McD. (CR).....	
HANCHETT, LELAND J.: See Norris, (Schneider, Hanchett, Kolher, and Hand-scrubbing techniques, preopera	
HANKINSON, DENZEL J. (Read, L Brown): Come-up time method of teurization.....	
HANKLA, EMILY K. L.: Glaucoma c in Philadelphia.....	
Hannah, J. A. (CR).....	
Hannegan, John M. (CR).....	
Hansen, James L. (CR).....	
Hardenbergh, W. A. (CR).....	
Harding, Harry B. (CR).....	
Harding, James G. (CR).....	
Hardy, Albert V. (CR).....	
HARDY, ALBERT V.: Public health Yesterday, today, and tomorrow...	
HARR, VERNON C., JR.: See Lucia, S and Hunt).	
Harper, Charles L., Jr. (CR).....	

Johansen, Frederick A., retires as medical officer in charge of the Public Health Service Hospital at Carville, La. (SR)-----	728
JOHNSON, CARL E.: <i>See</i> Law, Frank E. (Johnson and Knutson).	
Johnson, Leslie: <i>See</i> Part 2, Monograph No. 12.	
Johnson, Olive G.: <i>See</i> Part 2, Monograph No. 15.	
Johnston, J. Howard (CR)-----	116
JOHNSTON, McCLAIN: Adult guidance center, San Francisco-----	590
Jolliffe, Norman (CR)-----	125
JOLLY, JACK: <i>See</i> Fiumara, Nicholas J. (Segal and Jolly).	
Jute imports as plague source-----	802
Juvenile delinquency:	
Health services and-----	572
Psychiatric referrals of children-----	578
Rate increase of (SR)-----	1077

K

Kasdon, S. C.: <i>See</i> Part 2, Monograph No. 12.	
KAUFMAN, GENE (and Woolsey): Sex differences in the trend of mortality from certain chronic diseases-----	761
Keaton, Alice Glenn (CR)-----	275
KEATON, RUTH (Nash, Murphy, and Irons): Complement fixation tests for murine typhus on small mammals-----	28
Keefer, Chester Scott, appointed special assistant to the Secretary-----	889
KENNEY, S. M.: Two cooperative projects of WHO and UNICEF-----	606
KENNY, ALPHA K.: Simplifying local service records-----	1200
Kessel, Albert M., Laboratory of Pathology, National Cancer Institute, death of (SR)-----	1090
KETTERER, WARREN A.: Economic benefits of malaria control in the Republic of Indonesia-----	1056
— Village polyclinics in Middle Java-----	558
Kiker, John E., Jr. (CR)-----	203, 245
Kilander, H. F. (CR)-----	248
Kjentvet, Henry A. (CR)-----	231
Klassen, C. W. (CR)-----	234
Klimt, Christian R. (CR)-----	106
KLUMPP, THEODORE G.: Employment of the older worker-----	20
Knapp, Harold J. (CR)-----	112
Knutson, Andie L. (CR)-----	225
Knutson, Andie L.: <i>See</i> Part 2, Monograph No. 8.	
KNUTSON, JOHN W.: <i>See</i> Arnold, Francis A., Jr. (Dean and Knutson); Law, Frank E. (Johnson and Knutson); Waterman, George E. (and Knutson).	
Kogel, Marcus D. (CR)-----	94
KOHLER, CHARLES E.: <i>See</i> Norris, Edgar W. (Schneider, Hanchett, Kohler, and Buren).	
Koos, Earl Lomon (CR)-----	86
Kramer, Nathan (CR)-----	118
Krumbiegel, Edward R. (CR)-----	236

Krumbiegel, Stanley E., appointed medical officer of the PHS Outpatient Clinic (SR)----	954
Kuhns, Dwight M. (CR)-----	110
Kurland, Leonard T. (CR)-----	84
KURLANDER, ARNOLD B. (and Carroll): Case finding through multiple screening-----	1035
Kyle, J. Warren: <i>See</i> Part 2, Monograph No. 12.	

L

Labeling, chemical, committee reactivated-----	66
Labeling salt in food (SR)-----	1146
Laboratory:	
History of Florida public health-----	968
Protection from hazards in-----	989
Relationships, State, hospital and private (CR)-----	103
Reports: Korea, Australia, Egypt, Central America (CR)-----	99
Training courses (SR)-----	294
LADIMER, IRVING: <i>See</i> Black, James (Lynch and Ladimer).	
LAMSON, GLENN G., JR.: <i>See</i> Galagan, Donald J. (and Lamson).	
Lantis, Margaret: Social sciences in Alaska (B)-----	529
— The trend of science in Alaska (B)-----	528
Larmon, Russell Raymond, appointed Assistant Secretary (SR)-----	896
LARSON, GORDON P.: Air pollution and man's health in Los Angeles (B)-----	872
Latin America: <i>See</i> <i>Servicio</i> —PHS survey of the IIAA health program.	
LAUBUSCH, EDMUND J. (Geldreich and Jeter): Membrane filter procedure applied in the field-----	1118
LAW, FRANK E. (Johnson and Knutson): Studies on dental care services for school children. First and second treatment series. Woonsocket, R. I.-----	1192
Lawrence, Ray E. (CR)-----	238
Leavell, Hugh R. (CR)-----	134
Lee, Lyndon E., Jr. (CR)-----	95
Lefebvre, Luisa (CR)-----	95
Legal notes on public health:	
Constitutionality of delegation of legislative powers to State boards of health-----	733
Federal care and treatment of insane prisoners-----	825
Lehmann, Josephine: <i>See</i> Part 2, Monograph No. 10.	
Lemon, Eloise M. (CR)-----	94
Leone, Nicholas C. (CR)-----	131
Lepper, Mark H. (CR)-----	273
Lesser, Arthur J. (CR)-----	208
Liao, S. J. (CR)-----	101
Liberia, public health developments in (E)-----	1257
Lilienfeld, Abraham (CR)-----	130
LINDSAY, DALE R. (Stewart and Watt): Effect of fly control on diarrheal disease in an area of moderate morbidity-----	361
Link, Vernon B.: Trichinosis, a health and economic problem (B)-----	417

Linsky, Benjamin: Air pollution and man's health in Detroit (B).....	870	Mattison, Berwyn F. (CR).....	276
Lippincott, Stuart W.: See Part 2, Monograph No. 12.		McCALLUM, GORDON E. (and Ludwig): Public Health Service emergency assistance in disaster relief.....	630
Literature of rehabilitation of mental hospital patients (MS).....	1237	McCoy, Georgia France, appointed assistant to HEW Secretary (SR).....	801
Litsky, Warren (CR).....	247	McGibony, John R., appointed professor at the Graduate School of Public Health, University of Pittsburgh (SR).....	847
LITSKY, WARREN: See also Hankinson, Denzel J. (Read, Litsky, and Brown).		McIVER, PEARL: Survey of consultant nurses in health agencies.....	519
Llewellyn, John S. (CR).....	124	McKay, Frederick S. (CR).....	223
LOCKE, BEN Z.: See Mikol, Edward X. (and Locke).		McLEOD, CHARLOTTE P. (and Magnuson): Agglutination of <i>Treponema pallidum</i> in syphilitic serums.....	747
Loewus, Meral, assigned to Technical Cooperation Administration to Iran (SR).....	777	McNAUGHTON, DONALD W.: See Griffith, Robert L. (and McNaughton).	
Lombard, Herbert L. (CR).....	96	Measles, gamma globulin in the prophylaxis of.....	659, 661
LOMBARD, HERBERT L.: Twenty-six years of cancer control in Massachusetts.....	647	Mechanical air drying of hands following pre-operative scrubbing [Walker].....	317
Long, Esmond R. (CR).....	112	Medical care, agenda for exploration of current problems in.....	1225
Long, Fern (CR).....	226	Medical care plan statistics.....	157
LONGSHORE, WILLIAM ALLEN, JR.: See Halver-son, Wilton L. (Longshore and Peters).		Medical care plans and service (CR).....	118, 269
Looking back to look ahead in rural health [Crockett].....	480	Medical education scholarship loans in the Mississippi integrated health program [Under-wood].....	549
Loosli, Clayton G. (CR).....	91	Meister, Alton, wins 1954 chemistry award (SR).....	1106
Losty, Margaret A. (CR).....	107	Melnick, Joseph L. (CR).....	101
LUCIA, S. P. (Harp and Hunt): Cardiovascular syphilis in a general medical clinic.....	405	MELNICK, JOSEPH L. (Waltón and Myers): Isolation of a Coxsackie virus during a summer outbreak of acute minor illness.....	1178
LUDWIG, HARVEY F.: See McCallum, Gordon E. (and Ludwig).		—— See also Walton, Mary (and Melnick).	
Luzzatti, Luigi (CR).....	129	Membrane filter procedure applied in the field [Laubusch, Geldreich, and Jeter].....	118
LYNCH, JOHN M.: See Black, James (Lynch and Ladimer).		Menges, Robert W. (CR).....	263
Lynn, W. D.: See Part 2, Monograph No. 11.		Mental patients, 1950 census (SR).....	352
LYON, WALTER A. (and Miller): Recipients of the master's degree in sanitary engineering....	717	Method of simplifying soil percolation tests for septic tank systems [Gelperin and Fuller]....	693
		Metzner, A. (CR).....	121
		Meyer, Alvin, Jr. (CR).....	240
		Michael, Jerrold M. (CR).....	267
		Michigan University School of Public Health Conference: See Conference report: Public Health Statistics.	
		MIKOL, EDWARD X. (and Locke): Time between tuberculosis reporting and death.....	554
		Milk pasteurization come-up time method.....	769
		Milk sanitation honor roll:	
		1951-52.....	445
		1951-53.....	1015
		Miller, A. R.: Federal meat inspection, for trichinosis control (B).....	419
		MILLER, ARTHUR P.: See Lyon, Walter A. (and Miller).	
		Miller, Lloyd C.: United States pharmacopeia (B).....	510
		Miller, Myron D., appointed medical officer in charge of Public Health Service Hospital in Seattle (SR).....	954
		Miller, Paul A. (CR).....	255

M

MacCready, Robert H. (CR).....	262
MacKinnon, C. Frances (CR).....	225
Macklin, Madge T. (CR).....	98
Maglio, M. Martin (CR).....	260
MAGNUSON, HAROLD J.: See McLeod, Charlotte P. (and Magnuson).	
Malaria, experimental chemotherapy for: See Part 2, Monograph No. 9.	
Mallmann, W. L. (CR).....	247
Mantel, Nathan (CR).....	244
Mapping a program of public health for Ethiopia and Eritrea [O'Brien].....	976
Martin, Walter B. (CR).....	488
Mastoiditis in Alaska [Fritz] (B).....	537
Maternal and child health:	
Birth statistics in maternal and child health programs [Haenszel].....	71
Group action by parents of handicapped children (CR).....	127
Handicapped children, programs for (CR).....	257
Infant care research (SR).....	518
Mortality surveys and evaluations (CR).....	218
Services—challenges and aims [Baumgartner].....	397

N

Miller, Seward D. (CR).....	117	NASH, BILLIE JO: See Keaton, Ruth (Nash, Murphy, and Irons).	
Millian, S. J. (CR).....	262	National Citizens Committee for the World Health Organization Conference: See Conference report: World Health, National	
Milliken, Sewall O. (CR).....	88	National Conference on World Health: See Conference report: World Health, national.	
Milmore, Benno K. (CR).....	271	National formulary [Powers] (B).....	513
MILNE, J. A. (Rice, Hozier, and Taranto): Time study of public health activities in Mississippi.	378	National Research Council's statement on gamma globulin.....	660
Milzer, Albert (CR).....	108	Nature and purpose of local health unit record and report systems [Johnson].....	1078
MOELLER, DADE W. (Terrill and Ingraham): Radiation exposure in the United States....	57	Nature of the World Health Organization [Hyde].....	601
—— See also Ingraham, Samuel C., II (Terrill and Moeller).		Neff, Mildred (CR).....	124
MOLDENHAUER, RUTH M. (and Greve): General regulatory powers and duties of State and local health authorities.....	434	Nelson, Irene (CR).....	139
Monograph: See Part 2.		Nelson, Kinloch (CR).....	94
MOORE, GEORGE (and Foster): Selective case finding in syphilis control.....	167	Nelson, Russell A. (CR).....	219
Moorhead, Jennell V. (CR).....	217	New and nonofficial remedies, drug therapy [Stormont] (B).....	515
Morbidity:		"New occasions teach new duties" [Leavell]....	687
Anthrax.....	616	New orientation in the teaching of preventive medicine [Dearing].....	1147
Cancer, studies in metropolitan areas (SR) ..	975	Newman, Louis E. (CR).....	116
Diarrhea, effect of fly control on.....	361	NEWMAN, SIDNEY H. (and Howell): Research preferences and activities of Public Health Service officers.....	1183
Poliomyelitis.....	453	NICHOLSON, EDNA: Aggregate community picture, psychosocial aspects of cancer.....	153
Sources of, statistics (SR).....	55	Nicholson, Freddie (CR).....	108
Tuberculosis, January-June 1952.....	351	Nicholson, H. P.: See Part 2, Monograph No. 11.	
Tuberculosis, 1952 (SR).....	557	1950 census findings on health occupations.....	191
United States and Territories, 1952.....	1116	1952 encephalitis outbreak in California [Halver- son, Longshore, and Peters].....	368
MORDELL, J. SOLON (and Himmelsbach): Objec- tive approach to drug therapy.....	47	1952 summary of foodborne, waterborne, and other disease outbreaks [Dauer].....	696
Morin, Alfred F. (CR).....	252	Noble, Ralph E. (CR).....	246
Morse, Warren C. (CR).....	110	NORRIS, EDGAR W. (Schneider, Hanchett, Kohler, and Buren): Investigation of jute imports as potential plague source.....	802
Morse, William H. (CR).....	110	Norris, Margaret N. (CR).....	201
Mortality:		North, W. R. (CR).....	260
Accident, Tennessee.....	301	Noyes, Harold J.: Dental aspects of rural health in Oregon (B).....	492
Diabetes, by States for 1950.....	822	Nurses:	
Fog and deaths in London, December 1952 ..	474	Epidemiology course for (SR).....	15
Infant, rates, by age.....April ii		Positive approach to a tuberculosis nursing program.....	338
In the United States, 1900-1950 [Gordon]....	441	Services, distribution of, in hospitals.....	933
Poliomyelitis.....	453	Survey of consultant nurses in health agencies.....	519
Sex differences in the trend of, from certain chronic diseases.....	761	Nursing homes (CR).....	228
Trends in tuberculosis, in continental United States.....	911	Nutrition:	
Tuberculosis morbidity and, 1952 (SR) ...	557	Award (Goldberger) to William H. Sebrell, Jr.....	738
Tuberculosis, provisional data for 1952....	1013	Barriers to health in Latin America.....	1127
Tuberculosis reporting and.....	554	Enrichment . . . a public health approach to better nutrition [Sebrell].....	741
Mosquito control in Alaska [Wilson] (B).....	536	Research . . . potentialities in chronic dis- ease [Sebrell].....	737
Mott, F. D. (CR).....	123		
Mountin memorial session, APHA (CR).....	134		
Movement toward sound drug therapy (SR) ...	46		
Multiple screening: See Preventive medicine, case finding through.			
Mundy, Carll S. (CR).....	485		
Murmann, Edna (CR).....	200		
MURPHY, J. N., JR.: See Keaton, Ruth (Nash, Murphy, and Irons).			
Murray, Roderick (CR).....	131		
Myers, G. W. (CR).....	123		
MYERS, IRA L.: See Melnick, Joseph L. (Walton and Myers).			

O

Oberteuffer, Delbert (CR).....	213
Obesity:	
Approaches, scientific, group, and community (CR).....	121
Treatments, group conference.....	439
Objective approach to drug therapy [Mordell and Himmelsbach].....	47
O'BRIEN, HENRY R.: Mapping a program of public health for Ethiopia and Eritrea.....	976
O'Brien, James E. (CR).....	247
Occupational disease reporting [Trasko].....	940
Occupational factors in lung cancer [Breslow].....	286
Occupational health:	
Elements of programs for.....	October ii
Factors in lung cancer.....	286
Programs, government, industry, labor (CR).....	115
Scope and characteristics (CR).....	209
Occupational Health (periodical):	
Review of articles in.....	577, 732, 760, 792
Suspension notice.....	732, 792
Occupations, health, 1950 census findings.....	191
Occurrence of influenza in the United States, 1952-53 [Davis and Dauer].....	1141
ODOROFF, MAURICE E.: See Cronin, John W. (Odoroff and Abbe).	
Office of Education publications: See Publications: Title of.	
Office of Defense Mobilization publications: See Publications, Title of.	
Olansky, Sidney (CR).....	137
OLANSKY, SIDNEY: See Rivers, Eunice (Schuman, Simpson, and Olansky).	
Old, H. Norman (CR).....	242
OLDFIELD, H. G.: See Frazier, R. E. (and Oldfield).	
Olitzky, Irving (CR).....	111
Oliver, Dorothy S.: See Part 2, Monograph No. 14.	
O'NEAL, ROBERT M.: Histoplasmin sensitivity in Mississippi—A new boundary.....	714
Organizing mass gamma globulin clinics in three North Carolina counties [Cameron].....	1025
Origins of the American Public Health Association [Harris] (E).....	January ii
Origins of the APHA Southern Branch experiment on curbstone consultation [Freedman].....	1213
ORSBURN, BERTTINA: See Freeble, Charles R., Jr. (and Orsburn).	
Osburn, Stanley H. (CR).....	116
Osterritter, John F. (CR).....	212

P

PALMER, CARROLL E.: See Yuan, I-Chin (and Palmer).	
Paraguay, anthrax epidemic curbed in (SR).....	623
PARRAN, THOMAS: Tuberculosis: A time for decision.....	921
Parsons, Elizabeth I. (CR).....	108

Partnership in dental health [Rockefeller].....	1221
Pasteurization, milk, come-up time method of..	769
Paul, J. R. (CR).....	101
Pauls, Frank P.: Enteric diseases in Alaska (B)...	531
Peacock, Andrew W.: See Part 2, Monograph No. 12.	
Peck, Frank W. (CR).....	488
Pelton, Walter J. (CR).....	252
PETERS, RICHARD F.: See Halverson, Wilton L. (Longshore and Peters).	
Pfeiffer, Mildred C. J. (CR).....	95
Phair, W. Philip (CR).....	253
Phelps, Earle B. (CR).....	203
Phillips, F. Ruth: See Part 2, Monographs Nos. 14 and 16.	
Phipps, Henry, Institute golden jubilee celebration, papers for.....	921, 928
Pincoffs, Maurice C., appointed to the National Advisory Arthritis and Metabolic Diseases Council (SR).....	1230
Place of the physician in rural health activities [Henry] (B).....	490
Plague, jute imports as source of.....	802
Pohlmann, Kenneth E. (CR).....	84
Poliomyelitis:	
Current readings on.....	668
Distribution in the United States [Serfling and Sherman].....	453
Distribution in the United States, 1952 [Dauer].....	1033
Gamma globulin clinics organized in three North Carolina counties.....	1025
Gamma globulin distributed (SR).....	594
Gamma globulin in an outbreak of.....	1201
Gamma globulin in the prophylaxis of... 659, 662	
Research on.....	669
Trend of multiple cases of, in household units.....	996
Vaccine and gamma globulin field trials (CR).....	105
Virus type I adapted to mice (SR).....	466
Pollack, Earl S. (CR).....	97
Pollenosis.....	885
Polluted air, a growing community problem [Doyle].....	858
Pond, M. Allen (CR).....	238
Porter, E. Louise H. (CR).....	128
PORTER, WILLIAM L.: See Alter, Amos J. (and Porter).	
Porterfield, John D. (CR).....	254
Positive approach to a tuberculosis nursing program [Roberts].....	338
Potter, Carl C. (CR).....	267
Powers, Justin L.: National formulary (B).....	513
Practice of public health, 1952, APHA 80th annual meeting at Cleveland, Ohio, Oct. 20-24, 1952.....	81, 197
Prevention of rheumatic fever, American Heart Association Council on Rheumatic Fever and Congenital Heart Disease, statement on....	12

Preventive medicine:			
And the general practitioner (CR).....	132	Public, professional, industrial allies in sanitation [Hollis].....	805
Multiple screening, case finding through....	1035	Public responsibility in sound drug therapy [Tice] (B).....	509
New orientation in teaching of.....	1147	Publications:	
Screening program in a venereal disease clinic [Gruman].....	633	Annual report of the Public Health Service, Federal Security Agency, 1952.....	637
<i>See also</i> Part 2, Monograph No. 16.		Aortography by percutaneous catheterization of the femoral artery (PHS Pub. No. 283).....	1263
Price, E. R. (CR).....	264	Arthritis and rheumatism (PHS Pub. No. 29).....	452
Prisoners, insane, Federal care and treatment (LN).....	825	Basic drugs—U. S. Public Health Service hospitals and clinics (PHS Pub. No. 246).....	734
Professional education in public health. A survey of schools of public health, 1950 [Diehl]..	890	Bibliography of toxoplasmosis and <i>Toxoplasma gondii</i> (PHS Pub. No. 247).....	735
Program for protection of research employees against pathogenic hazards [Black, Lynch, and Ladimer].....	989	Biological products—Establishments licensed for the preparation and sale of viruses, serums, toxins and analogous products, and the trivalent organic arsenic compounds (PHS Pub. No. 50)....	826
Progress in research on poliomyelitis [Weaver]..	669	Cancer illness among residents of:	
Prothrombin time determinations training course.....	1140	Birmingham, Ala., Cancer Morbidity Series No. 8 (PHS Pub. No. 216)....	543
Protozoans in stools unpreserved and preserved in PVA-fixative [Goldman and Brooke].....	703	Denver, Colo., Cancer Morbidity Series No. 4 (PHS Pub. No. 112).....	196
Provisions of State laws governing local health departments [Greve].....	31	Detroit, Mich., Cancer Morbidity Series No. 9 (PHS Pub. No. 217).....	543
Psychiatric referrals for delinquent children [Gardner].....	578	Philadelphia, Pa., Cancer Morbidity Series No. 10 (PHS Pub. No. 244)....	736
Psychiatric rehabilitation:		Pittsburgh, Pa., Cancer Morbidity Series No. 5 (PHS Pub. No. 126)....	196
In the community [Williams].....	1043	Care of the eyes (PHS Pub. No. 113).....	827
In the hospital [Williams].....	1231	CDC 1951-1952 activities (PHS Pub. No. 302).....	1263
Psychosocial aspects of cancer: Five reports (SR).....	152	Child with a cleft palate (Children's Bureau Folder No. 37).....	1019
Public health aspects of civil defense [Cameron]..	1091	Clean water:	
Public health developments in Liberia [Rockefeller] (E).....	1257	Arkansas, White, Red, and lower Mississippi valleys (PHS Pub. No. 252).....	734
Public health in Indonesia [Jenney].....	409, 707	Hudson to the Potomac (PHS Pub. No. 202).....	544
Public health in the western States [Halverson]..	323	New England (PHS Pub. No. 199).....	544
Public health in transition, 1900-1950, a picture album (CR).....	88, 206	Ohio (PHS Pub. No. 203).....	544
Public health laboratory—Yesterday, today, and tomorrow [Hardy].....	968	Pacific Northwest (PHS Pub. No. 201).....	544
Public health operating statistics [Webster].....	467	South (PHS Pub. No. 250).....	827
Public health schools:		Tennessee (PHS Pub. No. 271).....	827
Effect of Public Law 779 on teaching and research at.....	656	Community-wide chest X-ray survey (PHS Pub. No. 222).....	196
Survey of.....	890	Community-wide installation of household garbage-grinders (PHS Pub. No. 224)....	545
Public Health Service emergency assistance in disaster relief [McCallum and Ludwig].....	630	Composition of the sanitary engineering profession. (Office of Education Scientific Manpower Series No. 2).....	543
Public Health Service hospitals, two closed (SR) ..	768	Comprehensive program for water pollution control for:	
Public Health Service officers' research preferences.....	1183	Red River of the North Basin (PHS Pub. No. 293).....	1263
Public Health Service publications: <i>See</i> Publications: Title of.		Yakima River basin (PHS Pub. No. 328).....	1264
Public Health Service regional offices consolidated (SR).....	919	Coronary artery disease (PHS Pub. No. 145).....	920
Public health statesmanship [Scheele].....	1		
Public Health Statistics Conference, 2d: <i>See</i> Conference report: Public Health Statistics, 2d.			
Public health surveys (CR).....	254		
Public health today—The Nation's best investment [Scheele].....	771		
Public health training program of New York State [Amos].....	295		
Public health trends, effects of social changes on.....	687		
Public Law 779, 1950 amendment to the Selective Service Act.....	656		

Publications—Continued

Diabetes (PHS Pub. No. 137).....	452
Dietitian in the hospitals of the Public Health Service (PHS Pub. No. 254).....	826
Diphtheria (PHS Pub. No. 60).....	640
Directory of full-time local health units, 1952 (PHS Pub. No. 118).....	636
Disabled can work, the (Office of Defense Mobilization, Health Resources Advisory Committee).....	544
Distribution of health services in the structure of State government, 1950. Part II, General services and construction of facilities for State health programs (PHS Pub. No. 184, Part II).....	140
Dog in medical research (PHS Pub. No. 312).....	1263
Draft act governing hospitalization of the mentally ill (PHS Pub. No. 51).....	636
Education materials on water pollution control (PHS Pub. No. 256).....	734
Fifty-first annual conference of the Surgeon General, Public Health Service, Chief, Children's Bureau with State and Territorial health officers (PHS Pub. No. 307).....	1139
Financial status and needs of dental schools (PHS Pub. No. 200).....	140
Genera of the homobasidiomycetes [Cooke] (U. S. Department of Agriculture, Division of Mycology and Disease Survey, Special Publication No. 3, 1953).....	1019
Guide to health organization in the United States (PHS Pub. No. 196).....	635
Handbook on sanitation of vessel watering points (PHS Pub. No. 274).....	1020
Head nurse looks at her job (PHS Pub. No. 227).....	452
Health manpower source book. Section 2. Nursing personnel (PHS Pub. No. 263).....	1139
Health of workers in chromate producing industry (PHS Pub. No. 192).....	826
Health status and services, January 1952. Economic base study, Arkansas-White-Red River basin (PHS Pub. No. 313).....	1020
Help fight pollution now (PHS Poster No. 5).....	636
Home accident prevention—A guide for health workers (PHS Pub. No. 261).....	735
Hypertension (PHS Pub. No. 146).....	640
Importance of nutrition to good health (PHS Pub. No. 162).....	452
Individual water supply systems. Revised 1950, reissued 1953 (PHS Pub. No. 24).....	1019
Job for women, a (Office of Defense Mobilization, Health Resources Advisory Committee).....	544
Keeping our hospitals operating. A study of supply and equipment requirements (PHS Pub. No. 272).....	545
Let's have clean water (PHS Pub. No. 264).....	734
Louse infestation (PHS Pub. No. 103).....	640
Management of chancroid, granuloma inguinale, and lymphogranuloma venereum (PHS Pub. No. 255).....	827

Publications—Continued

Milk ordinance and code. 1953 recommendations of the Public Health Service (PHS Pub. No. 229).....	735
National Heart Institute (PHS Pub. No. 241).....	635
Nursing in venereal disease control (PHS Pub. No. 198).....	140
Occupational disease reporting—A review of current practices, together with a collection of incidence statistics (PHS Pub. No. 288).....	940
Oral manifestations of occupational origin—An annotated bibliography (PHS Pub. No. 228).....	635
Organized health services in a county of the United States (PHS Pub. No. 197).....	451
Outpatient departments for 50-, 100-, 200-bed general hospitals (PHS Pub. No. 318).....	1019
Preschool child who is blind (Children's Bureau Folder No. 39).....	1263
Proceedings of the 2d Conference of Mental Administrators and Statisticians (PHS Pub. No. 266).....	639
Proceedings of the 2d Research Conference on Psychosurgery (PHS Pub. No. 156).....	360
Production at any age (Office of Defense Mobilization, Health Resources Advisory Committee).....	544
Public sewage treatment plant construction, 1952 (PHS Pub. No. 291).....	826
Rabies (PHS Pub. No. 97).....	638
Report on schools of public health in the United States (PHS Pub. No. 276).....	890
Reported incidence of selected notifiable diseases: United States, each division and State, 1920-50. Vital Statistics Special Reports, National Summaries, vol. 37, No. 9.....	920
Rheumatic heart disease (PHS Pub. No. 144).....	920
Salaries of local public health workers, April 1952 (PHS Pub. No. 237).....	360
Salaries of State public health workers, August 1952 (PHS Pub. No. 260).....	639
Sanitary landfill in northern States (PHS Pub. No. 226).....	545
Six food exchange lists for variety in meal planning (PHS Pub. No. 326).....	1139
Small plant health and medical programs (PHS Pub. No. 215).....	736
Trichinosis (PHS Pub. No. 101).....	640
Tuberculosis beds in hospitals and sanatoria, January 1, 1952 (PHS Pub. No. 253).....	451
Tularemia (PHS Pub. No. 135).....	640
Typhoid fever (PHS Pub. No. 282).....	920
Typical architectural program for a general hospital (PHS Pub. No. 322).....	1019
Ulcers (PHS Pub. No. 280).....	827
Venereal disease clinic directory (PHS Pub. No. 257).....	826
Virus and the cell (PHS Pub. No. 328).....	1264

Publications—Continued

Worker and his health, the (Office of Defense Mobilization, Health Resources Advisory Committee).....	544
Purdum, Paul W. (CR).....	268

Q

Quandt, Marjorie R. (CR).....	279
Quinby, Griffith E. (CR).....	274
Quinn, Margaret E. (CR).....	96

R

Rabies: Incidence of reactions to antirabies horse serum.....	789
Radiation, ionizing, effect on <i>Trichinella spiralis</i>	419
Radiation exposure in the United States [Moeller, Terrill, and Ingraham].....	57
Radiation exposure in the United States: Reactor-produced radioactive isotopes [Ingraham, Terrill, and Moeller].....	609
Radioactive isotopes:	
Distributed by AEC.....	60
Facility for use of, in general hospital.....	449
Radioisotopes.....	March ii
Reactor-produced.....	609
Ranck, Margaret (CR).....	228
Rapid method for distilling fluorides from water samples [Frazier and Oldfield].....	729
Rash, J. Keogh (CR).....	215
Ratbite fever due to <i>S. moniliformis</i> , case report of.....	947
Ratbites in Baltimore, 1948-52.....	1239
Rat-resistant construction materials (MS).....	824
See also Part 2, Monograph No. 11.	
Ratner, Frank (CR).....	131
Rausch, Robert: Animal-borne diseases, in Alaska (B).....	533
Reactivity of VDRL antigen suspensions made at various temperatures [Fugazzotto].....	304
Reactor-produced radioactive isotopes [Ingraham, Terrill, and Moeller].....	609
READ R. B.: See Hankinson, Denzel J. (Read, Litsky, and Brown).	
Recent progress in cancer research [Heller].....	309
Recipients of the master's degree in sanitary engineering [Lyon and Miller].....	717
Record and report systems in health departments:	
Coordinating medical and nursing records.....	1205
Elements of a coordinated system of vital records and statistics.....	793
Reexamining health record forms [Colby].....	1209
Simplifying local service records.....	1200
See also Part 2, Monograph No. 15.	
Rehabilitation:	
In the hospital [Rusk].....	281
Mental: See Part 2, Monograph No. 17.	
Psychiatric.....	1043, 1231
Vending stand program aids blind (SR)....	367

Reid, Jane: See Part 2, Monograph No. 12.	
Rein, Charles R. (CR).....	136
Reinhard, Karl R.: Distemperlike disease, in Alaska (B).....	535
Reinstein, Norbert (CR).....	224
Report of a case of ratbite fever due to <i>S. moniliformis</i> [Griffith and McNaughton].....	947
Research preferences and activities of Public Health Service officers [Newman and Howell].....	1183
Review of pollenosis and the role of weeds [Spain].....	885
Rheumatic fever:	
Community program, Newton, Mass.....	16
Statement on treatment.....	12
RICE, MARGARET E.: See Milne, J. A. (Rice, Hozier, and Taranto).	
Rich, Herbert (CR).....	107
RICHARDSON, WILLIAM P.: Three years' experience with curbstone consultation.....	1217
Richmond, Sara G.: See Part 2, Monograph No. 12.	
Rico, Arnaldo Lopez (CR).....	137
Ridenour, Gerald M. (CR).....	261
Rider, Rowland V. (CR).....	255
Rigney, Thomas G. (CR).....	98
RIVERS, EUNICE (Schuman, Simpson, and Olansky): Twenty years of followup experience in a long-range medical study.....	391
ROBERTS, DORIS E.: Positive approach to a tuberculosis nursing program.....	338
ROBERTSON, ROGER L.: See Anderson, Robert J. (Sauer and Robertson).	
Robins, Arthur B. (CR).....	114
Robins, Morton (CR).....	280
Rockefeller, Nelson A., named Undersecretary of Health, Education, and Welfare (SR).....	655
Rockefeller, Nelson A.: Public health developments in Liberia (E).....	1257
ROCKEFELLER, NELSON A.: Partnership in dental health.....	1221
Rockefeller public service award to Martin D. Young.....	553
Rodent control in epidemics and disasters.....	334
ROGOT, EUGENE: See Iskrant, Albert P. (and Rogot).	
Romeo, Salvatore M. (CR).....	218
Rose, Elizabeth Kirk (CR).....	138
Rose, John A. (CR).....	138
Rosenfeld, Leonard S. (CR).....	118, 123
Rosenfeld, A. B. (CR).....	219
Ross, Elizabeth Healy, appointed deputy chief of the Children's Bureau (SR).....	53
Roth, F. B. (CR).....	123
Rowe, C. O.: Introduction (to <i>Servicio</i>) (E).....	830
Rural Health Conference, 8th national: See Conference report: Rural Health, 8th national, sponsored by AMA.	
Rural sanitation.....	1107
Rusk, Howard A., appointed member of the National Advisory Arthritis and Metabolic Diseases Council (SR).....	1191
RUSK, HOWARD A.: Rehabilitation in the hospital.....	281

STEWART, WILLIAM H.: See Lindsay, Dale R. (Stewart and Watt).	
Stocklen, Joseph B. (CR).....	112
Stokes, Joseph, Jr. (CR).....	106, 130
Stormont, R. T.: New and nonofficial remedies, drug therapy (B).....	515
<i>Streptobacillus moniliformis</i> and ratbite fever.....	947
Studies on dental care services for school children. First and second treatment series:	
Richmond, Ind. [Waterman and Knutson].	583
Woonsocket, R. I. [Law, Johnson, and Knutson].....	1192
SULLIVAN, ANNA LOVE: Tennessee accident fatalities, 1946-50.....	301
Sullivan, Thelma D. (CR).....	201
Surgeon General's Conference: See Conference report: State and Territorial.	
Survey of:	
Consultant nurses in health agencies [McIver].....	519
Schools of public health, 1950.....	890
Surveys—Program yardsticks (CR).....	254
Sussman, Oscar: State problems in trichinosis control (B).....	420
Sutherland, Marjorie L. (CR).....	247
Svore, Jerome H. (CR).....	233, 234
Symposium:	
Developing trends of sound drug therapy...	509
Record and report systems in local health departments.....	1199
Venereal disease, announcement of.....	395
Syphilis:	
Capillary tube technique for serologic screening of syphilis.....	341
Cardiovascular, in a general medical clinic...	405
Followup experience in long-range study.....	391
Reactivity of VDRL antigen suspensions made at various temperatures.....	304
Records of veterans (SR).....	562
Selective case finding in control of.....	167
<i>Treponema pallidum</i> , agglutination, in syphilitic serums.....	747
See also Venereal disease.	

T

Taback, Matthew (CR).....	120, 280
TABACK, MATTHEW (and Williams): Statistics in a health department medical care plan.....	157
TARANTO, GRACE B.: See Milne, J. A. (Rice, Hozier, and Taranto).	
Tarzwell, C. M.: See Part 2, Monograph No. 11.	
TAYLOR, FLOYD B.: See Bevis, Herbert A. (Tetzlaff and Taylor).	
Teaching-learning situation [Allport].....	875
Technical assistance for public health in the Republic of Indonesia [Jenney].....	707
Technical publications: See Publications: Title of.	
Television in health education.....	817
Tennessee accident fatalities, 1946-50 [Sullivan].	301
Tennessee Valley Authority, health conservation activities of.....	327

TERRILL, JAMES G. JR.: See Ingraham, Samuel C., II (Terrill and Moeller); Moeller, Dade W. (Terrill and Ingraham).	
Tests:	
Cancer diagnostic (MI).....	880
Complement fixation, for murine typhus on small mammals.....	28
Membrane filter procedure in the field.....	1118
Soil percolation, method of simplifying.....	693
<i>Treponema pallidum</i> immobilization.....	747
TETZLAFF, FRANK: See Bevis, Herbert A. (Tetzlaff and Taylor).	
Three years' experience with curbstone consultation [Richardson].....	1217
THURSTON, JOHN L.: The state of the Nation's public health services. 2. Report on Federal-State relations.....	181
TIBBITTS, HELEN G.: Distribution of hospital nursing services.....	933
Tiber, Bertha, assigned to Tripoli (SR).....	30
Tice, Linwood F.: Public responsibility in drug therapy (B).....	509
Time between tuberculosis reporting and death [Mikol and Locke].....	554
Time study of public health activities in Mississippi [Milne, Rice, Hozier, and Taranto].....	378
"Tower of Babel," danger of building [Bush]..	149
Training courses and programs:	
Diabetes control (SR).....	433
Environmental health (SR).....	823
Epidemiology, for nurses (SR).....	15
Health personnel, <i>Servicio</i> program.....	1243
Hospital administrators (SR).....	931
Insect and rodent control (SR).....	294
Laboratory (SR).....	294
New York State program.....	295
Pediatricians and nurses (CR).....	139
Prothrombin time determinations.....	1140
Venereal disease control (SR).....	755, 821
TRASKO, VICTORIA M.: Occupational disease reporting.....	940
Treatment of tuberculosis [Amberson].....	928
Trend of multiple cases of poliomyelitis in household units [Siegel and Greenberg].....	996
Trend of science in Alaska [Lantis] (B).....	528
Trends in tuberculosis mortality in continental United States [Iskrant and Rogot].....	911
Trichinosis conference: See Conference report: Trichinosis, 1st national.	
Trichinosis control:	
And vesicular exanthema [Haldeman, Steele, and Van Derwerker].....	421
By disinfecting garbage in trucks.....	1065
Prevalence, transmission, prevention (CR).....	417
Tuberculin and histoplasmin sensitivity in Texas infants and children.....	320
Tuberculin sensitivity in Alaska [Weiss].....	23
Tuberculosis:	
Cases known to health departments [Anderson, Sauer, and Robertson].....	641
Chemotherapy, surgery, vaccination (CR).....	112

Tuberculosis—Continued

Fifty years of, study, treatment, prevention [Editors].....	922
Morbidity, January-June 1952.....	351
Morbidity and mortality, 1952 (SR).....	557
Morbidity report, 1952, United States and Territories.....	1116
Mortality by State, 1950.....	628
Mortality, provisional data for 1952.....	1013
Positive approach to a nursing program for Prevention.....	338
Time between reporting of, and death.....	922
Time for decision [Parran].....	554
Treatment.....	921
WHO, research office.....	922, 928
X-ray surveys, communitywide.....	678
	546

TVA: *See* Tennessee Valley Authority.

Twenty years of followup experience in a long-range medical study [Rivers, Schuman, Simpson, and Olansky].....	391
Twenty-six years of cancer control in Massachusetts [Lombard].....	647
Two cooperative projects of WHO and UNICEF [Keeney].....	606
Two water systems in Northern Canada and Alaska [Copp] (B).....	538
Typhus, murine, complement-fixation tests for..	28

U

Underwood, Felix J.: Medical education scholarship loans in the Mississippi integrated health program.....	549
Unfinished business and new forces in environmental health orthodoxy [Wolman].....	962
UNICEF: <i>See</i> World Health Organization and UNICEF projects.	
United Nations Day (SR).....	1012
United States Department of Agriculture publication: <i>See</i> Publications: Title of.	
United States Department of Health, Education, and Welfare created (SR).....	496
United States pharmacopeia [Miller] (B).....	510
United States vital statistics, 1951-1952.....	68
Updyke, Elaine L. (CR).....	109

V

Vaccination certificates, international:	
Requires official stamp (SR).....	11
Revised form of.....	932
Value of good service statistics in a modern health department [Flook].....	811
VAN DERWERKER, RALPH J.: <i>See</i> Haldeman, Jack C. (Steele and Van Derwerker).	
Vending stand program aids blind (SR).....	367
Venereal disease:	
Annual symposium (CR).....	395
Contact investigation. A combined military-civilian program [Fiumara, Segal, and Jolly].....	289
International control of.....	779

Venereal disease—Continued

Preventive medicine screening program in a, clinic.....	633
Training courses in control of (SR).....	755, 821
Treponematoses; premarital blood test laws; laboratory evaluation (CR).....	136
<i>See also</i> Syphilis.	
Vera, Harriette D. (CR).....	111
Village polyclinics in Middle Java [Ketterer]...	558
Virus, the cell, and the potentialities of influenza [Burnet] (E).....	1145
Virus: <i>See also</i> Coxsackie; Influenza; Poliomyelitis.	
Visiting scientist program in The National Institutes of Health (SR).....	285
Vital statistics:	
Birth statistics in maternal and child health programs.....	71
Births, United States, January-April 1953..	788
Record system.....	793
United States, 1951-52.....	68
Voelker, M. Loyola (CR).....	280

W

Wadman, Ruth (CR).....	118
Wadsworth, James J.: National Conference on World Health address (E).....	605
Wagner, Bernard M. (CR).....	110
Walker, Herbert F. (CR).....	208
WALKER, PAUL E.: Mechanical air drying of hands following preoperative scrubbing.....	317
Wallace, Helen M. (CR).....	107, 122
WALTON, MARY (and Melnick): Coxsackie virus antibody and incidence of minor illness during the summer.....	1167
—— <i>See also</i> Melnick, Joseph L. (Walton and Myers).	
Warts, plantar, among school children.....	985
Water and sewage (CR).....	245
Water conservation (CR).....	234
Water pollution:	
Abatement of stream pollution caused by industrial wastes.....	43
Membrane filter procedure in.....	1118
Studies in Alaska [Alter and Porter] (B)...	539
Trends and studies in.....	1099
Water, sewage, and industrial waste research trends and needs [Wieters and Dworsky].....	1099
Water systems in northern Canada and Alaska (B).....	538
Waterman, George E. (CR).....	248
WATERMAN, GEORGE E. (and Knutson): Studies on dental care services for school children, Richmond, Ind.....	583
Waterman, Theda L. (CR).....	228
WATT, JAMES: <i>See</i> Lindsay, Dale R. (Stewart and Watt).	
Waybur, Anne (CR).....	271
We are in danger of building a Tower of Babel [Bush].....	149

WEAVER, HARRY M.: Progress in research on poliomyelitis.....	669
WEBSTER, ROBERT G.: Public health operating statistics.....	467
Wegman, Myron E. (CR).....	122
Wehrle, Paul F. (CR).....	106
Weight control (CR).....	124
Weinerman, E. Richard (CR).....	270
Weiser, H. H. (CR).....	260
WEISS, EDWARD S.: Tuberculin sensitivity in Alaska.....	23
—— See also Scott, Edward M. (and Weiss).	
Wells, William Firth (CR).....	240
Wenner, Herbert A. (CR).....	263
Westlund, Knut B. (CR).....	84
Wetmore, Psyche W. (CR).....	264
Whitehead, Floy Eugenia (CR).....	248
WHO: See World Health Organization.	
WIETERS, ALFRED H. (and Dworsky): Water, sewage, and industrial waste research trends and needs.....	1099
Wilder, Russell M., first director of the National Institute of Arthritis and Metabolic Diseases, NIH, retires (SR).....	728
WILEY, JOHN S. (and Stephens): Insect and rodent control in epidemics and disasters.....	334
WILHELM, GERTRUDE: See Grigg, Walter K. (and Wilhelm).	
Willard, William R. (CR).....	227
Willett, Joseph C. (CR).....	264
Williams, Charles R. (CR).....	241
Williams, Huntington (CR).....	209
WILLIAMS, HUNTINGTON: See also Taback, Matthew (and Williams).	
Williams, Louis L., Jr., chief of the Division of International Health, retires (SR).....	390
WILLIAMS, RICHARD H.: Psychiatric rehabilitation in the community.....	1231
—— Psychiatric rehabilitation in the hospital.....	1043
Wilson, Charles C. (CR).....	209
Wilson, Charles S.: Mosquito control in Alaska (B).....	536
Wilzbach, Carl A. (CR).....	208
Winslow, C.-E. A. (CR).....	202
Winslow lecture [Scheele].....	1, 5
Wishik, Samuel M. (CR).....	127
Wolff, Arthur H. (CR).....	206
WOLMAN, ABEL: Unfinished business and new forces in environmental health orthodoxy.....	962
WOOLSEY, THEODORE D.: See Kaufman, Gene (and Woolsey).	

World Health, National Conference on: See Conference report: World Health, national.	
World health achievements (SR)-----	438
World Health Day (SR)-----	357
World Health Organization:	
And UNICEF projects-----	606
Director general appointed (SR)-----	631
Influenza study program in the United States-----	1141
Nature of-----	601
Tuberculosis research office [Yuan and Palmer]-----	678
Wright, Earl O. (CR)-----	230
WRIGHT, WILLARD H. (and Dobrovolsky): Ex- periments in the control of schistosomiasis in Brazil-----	1156

X

X-ray surveys:	
Communitywide.....	546
Heart disease screening in.....	415

Y

Yager, Robert H. (CR)-----	264
Yankauer, Alfred (CR)-----	218
Yarbrough, Mary E. (CR)-----	111
Yoder, Franklin D.: County health councils and public health (B)-----	489
Yoho, Robert O. (CR)-----	233
Young, Martin D., awarded Rockefeller public service award (SR)-----	553
Your family doctor in Baltimore: Health educa- tion via television [Gordon]-----	816
Yuan, I-Chin (and Palmer): The WHO tuber- culosis research office-----	678

Z

Zimmerman, Lorenz E. (CR)-----	99
Zindell, Lilyan C. (CR)-----	486
Zindwer, Renée (CR)-----	250
Zopf, Louis C.: Comments on the symposium on sound drug therapy (B)-----	517
ZWICK, DANIEL I.: See Fox, Paul E. (and Zwick).	

Public Health Monographs

1953 Titles—Numbers 8–17

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